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T. F. Hunt.

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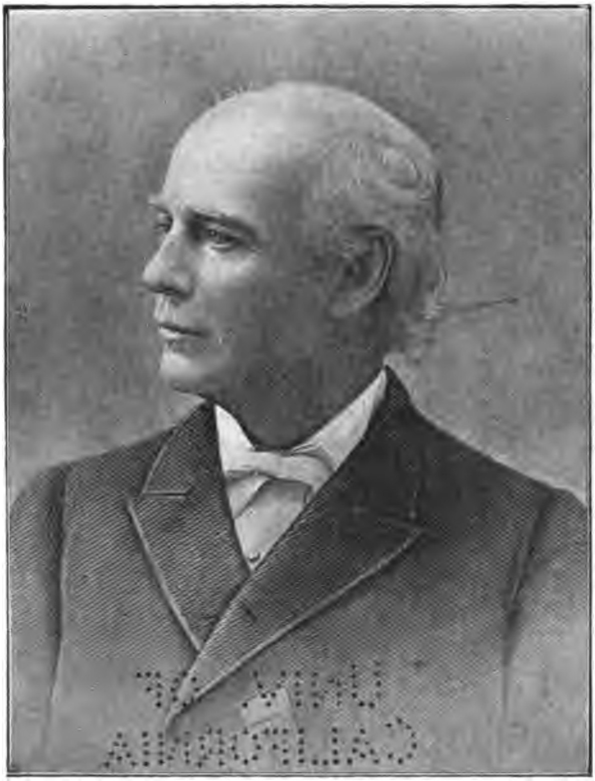

EDWARD ORTON, PH. D., LLD.

# ANNUAL REPORT

OF THE

# COLUMBUS HORTICULTURAL SOCIETY

For the Year Ending December 31, 1899,

COMPRISING

The Constitution of the Society, List of Members and
Officers, and Proceedings of the Meetings, together
with Papers and Discussions.

EDITED BY
HOMER C. PRICE,
SECRETARY.

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# COLUMBUS HORTICULTURAL SOCIETY.

## 1899.

### OFFICERS.

| | |
|---|---|
| WILLIAM R. LAZENBY, | *President* |
| T. A. SCOTT, | *Vice-President* |
| HOMER C. PRICE, | *Secretary* |
| GEORGE W. SINKS, | *Treasurer* |

### Executive Committee.

O. W. ALDRICH, HERBERT OSBORN, J. J. JANNEY.

### Chairmen of Standing Committees.

| | |
|---|---|
| *Botany,* | L. H. McFADDEN |
| *Vegetable Pathology,* | W. A. KELLERMAN |
| *Entomology,* | JAMES S. HINE |
| *Meteorology,* | WILLIAM R. LAZENBY |
| *Library,* | J. J. JANNEY |
| *Fruits,* | GEORGE W. GILL |
| *Plants and Flowers,* | HARRY BALLOU |
| *Vegetables,* | H. M. SESSIONS |

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## LIFE MEMBERS.

O. W. Aldrich,
William G. Deshler,
C. J. Hardy,
Alexander Houston,
J. J. Janney,
J. K. Jones,
Mrs. J. H. Klippart,
Mrs. N. E. Lovejoy,
John M. Pugh,
George W. Sinks,

of Columbus.

| | |
|---|---|
| W. S. Devol, | Riverside, Cal. |
| W. J. Green, | Wooster, O. |
| T. A. Scott, | Westerville, O. |

## MEMBERS.

H. Ballou,
W. R. Beattie,
Mrs. Joseph Bradford,
Mrs. J. H. Brenneman,
Mrs. Henry C. Bruenning,
D. C. Burson,
S. C. Comeans,
C. W. Critchfield,
S. C. Derby,
John G. Deshler,
Miss Freda Detmers,
Geo. W. Gill,
John L. Gordon, Jr.,
E. C. Green,
J. S. Hine,
Thomas F. Hunt,
W. A. Kellerman,
Albert Knopf,
J. H. Lageman,
William R. Lazenby,
Mrs. P. J. Lofland,
F. K. Luke,
W. C. Mills,
Herbert Osborn,
Charles Parrott,
H. C. Price,
A. D. Rodgers,
R. M. Rownd,
Horace M. Sessions,
Geo. T. Spahr,
L. K. Sutton,
F. P. Sperry,
J. Warren Smith,
J. B. Streeper,
Mrs. Jos. Sullivant,
E. M. Wilcox,

of Columbus.

John F. Bachman and Wife,
Geo. Barnhart,
Geo. F. Bareis and Wife,
Charles Bruns,
L. W. Beery and Wife,
Daniel Detwiler and Wife,
T. M. Fouts and Wife,
Philip Game and Wife,
B. F. Gayman and Wife,
Miss Eliza Gayman,
Isaac Lehman and Wife,
E. A. Peters and Wife,
B. F. Showalter and Wife,
I. E. Stevenson and Wife,
R. J. Tussing and Wife,
E. S. Tussing and Wife,

of Canal Winchester, O.

## MEMBERS—Continued.

Frank Clotts,
John D. Ross,

of Gahanna, O.

Stephen Cook,
F. P. Dill,
J. W. Everal,
John Haywood,
Jas. Best and Wife,
L. H. McFadden,
H. Warren Phelps,
C. E. Sharp and Wife,

of Westerville, O.

Aug. D. Selby,
Charles E. Thorne,
F. M. Webster,

of Wooster, O.

Mary Cheney,
Mary Jenny,
Mrs. E. Thomas,
J. Wetherall,

of Camp Chase, O.

| | |
|---|---|
| William B. Alwood, | Blacksburg, Va. |
| F. W. Barr, | Brice, O. |
| L. M. Bloomfield, | Marlboro, O. |
| E. E. Bogue, | Stillwater, Okla. |
| Nelson Cox, | Ensee, O. |
| Moses Craig, | Corvalis, Ore. |
| M. Crawford, | Cuyahoga Falls, O. |
| John F. Cunningham, | Cleveland, O. |
| C. L. Dickey, | Worthington, O. |
| K. C. Egbert, | Yainax, Oregon. |
| C. R. Elsea and Wife, | Lithopolis, O. |
| James T. Miller, | Marble Cliff, O. |
| Wm. Miller, | Gypsum, O. |
| Mrs. Emmet Mix, | Avenue, O. |
| Mrs. T. O. Phinney, | Clintonville, O. |
| Welton Seymour, | Groveport, O. |
| Wm. C. Werner, | Painesville, O. |
| C. K. Wilson, | Springfield, O. |

## HONORARY MEMBERS.

| | |
|---|---|
| B. W. Carlisle, | Lancaster, O. |
| J. A. Fetters, | Lancaster, O. |
| J. J. Harrison, | Painesville, O. |
| George M. High, | Middle Bass, O. |
| W. H. Latham, | Indianapolis, Ind. |
| William McKeller, | Lancaster, O. |
| N. Ohmer, | Dayton, O. |
| W. B. Stover, | Akron, O. |

# CONSTITUTION.

## NAME AND OBJECT.

**Section 1.** This Society shall be known as the **Columbus Horticultural Society**.

**Sec. 2.** The object for which it is organized is the advancement of horticultural knowledge.

## MEMBERSHIP.

**Sec. 3.** Any person may become a member of the Society by the payment of one dollar. Wives and daughters of members shall be members without the payment of any fee. Male members shall pay an annual fee of fifty cents, in advance, which shall be for the year ending with the next succeeding annual meeting; and no member shall have the right to vote, or other privilege of membership of the Society, so long as such annual fee shall remain unpaid. Any lady resident in Franklin County may become a member without any fee.

**Sec. 4.** Any person may become a life member of the Society upon payment of ten (10) dollars, which shall be in lieu of all assessments or annual dues; and all persons who have been members for twenty or more years, and have paid their regular dues, shall be life members.

**Sec. 5.** Any person distinguished in horticulture, upon the recommendation of the Executive Committee, may be elected an honorary member of the Society by the affirmative vote of two-thirds of the members present at any regular meeting. Honorary members shall not have the right to vote nor incur any of the liabilities of members, but they shall be admitted to all meetings and exhibitions of the society.

## OFFICERS.

**Sec. 6.** The officers of the Society shall be a President, a First Vice-President, as many Vice-Presidents as there may be local sections of the Society, a Secretary, a Treasurer, and an Executive Committee of three members, all of whom, except the Vice-Presidents *ex-officio*, shall be elected by ballot at the regular meeting in December, and shall serve until their successors are elected. The President of each section shall be *ex-officio* Vice-President of this Society.

**Sec. 7.** The President, or, in his absence, the Vice-President, shall preside at all meetings of the Society and of the Executive Committee. In the absence of both, a President *pro tem.* shall be appointed.

**Sec. 8.** The Secretary shall keep a record of the proceedings of the Society, and attend to all necessary correspondence. He shall also receive all moneys due the Society for membership, annual fees and assessments, and pay over the same to the Treasurer; and shall receive as a remuneration for his services the sum of fifty (50) dollars per year.

SEC. 9. The Treasurer shall receive from the Secretary all money and funds belonging to the Society, and shall be the custodian of all bonds, stocks and securities belonging to the Society, and shall pay out and transfer the same only on the order of the Society, certified by the President and Secretary; and he shall keep an account of the receipts and disbursements, and report it to the annual meeting; and shall give such bonds as the Executive Committee may require.

SEC. 10. The Executive Committee shall have control of all exhibitions, and have a general supervision of all matters pertaining to the welfare of the Society. It shall have power to call special meetings whenever, in its judgment, it shall be necessary.

SEC. 11. The chairmen of the standing committees shall be elected at the annual meeting, and such chairmen shall have the power to appoint the other members of their respective committees.

SEC. 12. The following standing committees shall be elected:

1. On Botany.
2. On Vegetable Pathology.
3. On Entomology.
4. On Meteorology.
5. On Library.
6. On Fruits.
7. On Plants and Flowers.
8. On Vegetables.

## INVESTMENTS.

SEC. 13. The Executive Committee shall make and manage all investments. No investment shall ever be changed without the recommendation of said committee, approved by two-thirds each of the members and life members of the Society; nor shall the present invested fund of the Society ever be reduced in amount; but if it should become so by any unavoidable cause, the income shall be invested until the full amount is restored.

SEC. 14. The funds of the Society shall be invested either in the bonds of the United States, the State of Ohio, the City of Columbus, or Franklin County, Ohio; or in loans not exceeding the legal rate of interest in the State of Ohio, payable semi-annually or annually, and secured by first mortgage on unincumbered real estate, situated in Franklin County, Ohio, of the value of twice the amount of the sums loaned thereon, exclusive of buildings and improvements.

## LOCAL SECTIONS.

SEC. 15. Whenever a local membership of ten or more members of the Society, in good standing, residing at or near any point in Franklin County shall make application to the Society it may grant to said members permission to organize a Section to further the objects of the Society; said Section be authorized to hold meetings, elect officers, recommend persons for membership in the Society, and to originate and recommend such measures as shall be deemed proper, but the meetings of the Section shall occur on some other day than that of the regular meeting of the Society.

SEC. 16. All annual fees of members affiliating with any Section and 50 per cent. of the membership fees of those recommended by the Section shall be reserved by it, the money thus accruing to be expended in such manner, consistent with the object of the organization, as it may direct.

SEC. 17. All members affiliating with any Section and paying annual dues to the same shall be entitled to the JOURNAL of the Society.

SEC. 18. Each Section shall choose its own officers, of such number as it may determine, including a President, who shall become one of the Vice-Presidents of the Society, and a Secretary-Treasurer, who shall communicate to the Secretary of the Society on or before the annual meeting of each year a report of the condition of the Section for that year, and directly following the meeting in March, June, September and December a quarterly abstract of the proceedings for publication in the JOURNAL, the form and extent of such reports to be under the direction of the Secretary of the Society.

### AMENDMENTS.

SEC. 19. This Constitution may be amended at any regular meeting of the Society: Provided, such proposed amendment shall have been submitted, in writing, at least, one week before such meeting.

## BY-LAWS.

### ORDER OF BUSINESS.

SECTION 1. The following shall be the order of business at every meeting, unless changed at the time by the vote of the meeting:

1. Reading the minutes of the preceding meeting.
2. Unfinished business.
3. Election of members.
4. Reports of special committees.
5. Reports of standing committees.
6. Communications and correspondence.
7. Regular paper or address and discussion.
8. Miscellaneous business.
9. Adjournment.

### TIME OF MEETING.

SEC. 2. Regular meetings shall be held on the last Saturday of each month, at 2:00 p. m.

UNIV. OF
CALIFORNIA

# Columbus Horticultural Society.

QUARTERLY JOURNAL OF PROCEEDINGS.

VOL. XIV. COLUMBUS, OHIO, MARCH, 1899. No. 1.

## PROCEEDINGS OF THE SOCIETY.

### JANUARY.

January 28, 1899.

Society met in Horticultural Hall, with Vice-President T. A. Scott, presiding.

Mr. Clarence Campbell, of Camp Chase, O., and Mr. L. K. Sutton, of Columbus, O., were elected to membership.

Mr. Gill showed an especially fine apple and asked the name of the variety. He also suggested exhibitions of fruit in order to increase the interest in the Society.

Mr. Janney said that he hardly thought that it was wise to offer premiums.

Mr. Gill also read from U. S. Department of Agriculture, "there is now some talk of using the Northern Spy as a resistant stock against the root aphis."

The question was then asked, whether the stock had any effect upon the scion that is grafted upon it? Mr. Hine said that the olive is thought to be an exception, and that the stock would always produce the same fruit, no matter what the variety of the bud grafted on it.

It seemed to be the general opinion that the graft usually comes true, no matter what the nature of the stock may be.

Mr. Sessions said that from an experience of sixty years in grafting, he had found that the fruit from the scion is sometimes altered in a small way by the effect of the root, but that the change was never great.

Prof. Lageman mentioned grafting quince upon hawthorne. The effect upon the fruit was not noticeable. By grafting tame cherry upon wild stock the tame tree stock was much larger than the wild stock, and the fruit was bitter and not good.

Mr. Sessions said that he had often grafted white pears upon hawthorne and had good results.

Upon motion of Mr. Janney the Committee on Fruits and Vegetables was directed to report on advisability of holding an exhibition of fruits and vegetables each month.

The regular program was then taken up, as follows:

"The Pedigree of the Daisy,"..................A. D. Mason.
"The Origination of New Varieties by the Horticulturist,"
John F. Cunningham.

Prof. Lageman then made an addendum to Mr. Mason's paper, as follows: "Bellis, according to Pliny, was Bellis perennis, derived from Bellus, nice, very beautiful. Perennis means lasting several years. It grows and blooms in red and white ray flowers the whole year in the plain and even high up in the Alps. Formerly it was used by the country people as a tea for consumptive catarrh.

It is not found in Australia, as it was at first believed to grow there, but the supposed plant was Brachycome decipiens Cass.

The white-red blooming, double variety of Bellis is used in Germany especially for bordering flower beds.

Bellidiastrum Michelii (Doronicom bellidiastrum), a similar plant on the Alps, is in all its parts of a larger size."

Mr. Houston asked the actual maximum amount of potatoes that could be raised on an acre of ground in Ohio.

Mr. Gill said that 500–600 bushels per acre had been raised on some of his land between the Scioto and Olentangy rivers, in Columbus.

Prof. Hunt stated that the average yield of potatoes for the U. S. is seventy-six bushels per acre.

Mr. Janney asked if a cross between wheat and rye were possible. Mr. Fulmer reported that such a cross had been made.

Mr. Janney said that he thought the Society should take some action in regard to Col. G. S. Innis, whose death occurred in January. He was assigned the duty of preparing a sketch.

Society adjourned.

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### FEBRUARY.

Meeting called to order at 2:30, by President Lazenby.

The name of Mr. George Francis, of Clintonville, was proposed for membership, and the gentleman was elected.

Under the head of special committees, Mr. Janney read a short memorial of Col. G. S. Innis. This memorial is printed elsewhere in this Journal.

The committee on fruit exhibitions was continued.

Mr. R. J. Tussing reported the fact of certain rows of lettuce in the greenhouse becoming stunted in their growth, where the ground had been fertilized with manure from a blacksmith shop. Upon observation he found numerous specimens of a small dark-colored cocoon on the under side of the leaf.

Mr. Cunningham raised the question whether the stunted growth was due to the presence of the insects making the cocoons or whether it was due to the effects of the unrotted manure upon the plant. The insects had not eaten the plants in the least.

The effect of cold weather upon the unprotected insects was brought up and discussed. Professor Lazenby called attention to the fact that the codling moth can stand almost any degree of cold, unprotected.

Under the head of Meteorology, President Lazenby said that the last cold spell has been equalled only by that of January, 1884. At that time for three days in succession the thermometer stood —32°, —29° and —19°. He also said that a difference of a few feet in altitude will make a difference of several degrees. The cold of 1884 actually *killed* peach and quince trees that had been standing for twelve years.

Mr. Houston said that the winter of 1855–56 killed every peach tree in Ohio, There was not a peach for sale in the Columbus market during the following summer.

Mr. Janney reported the receipt of "Thirty Poisonous Plants of the United States," a Government publication.

Mr. Miller, of Ottawa County, said that the peach crop was not killed, as was at first thought. He reported apricots and Japan plumbs as not injured, and live buds on nearly all varieties of peaches.

Mr. Cunningham showed some fine specimens of cineraria from the greenhouse of the Department of Horticulture of the University.

Mr. Sutton reported that about one-fifth of the buried potatoes of Michigan were frozen. Apples and cabbage were also reported as frozen badly in western New York. He also stated that he had known potatoes to stand a temperature of ten degrees below zero. Mr. Best mentioned the good effects of freezing upon parsnips.

The regular program was then taken up, as follows:

"Horticulture From a Commercial Standpoint,"..L. K. Sutton.
"Plans for 1899,"..............................Ed. S. Tussing.
"All Kinds of Weeds,".......................J. H. Lageman.

Mr. Sutton asked about late strawberries. Prof. Lazenby said that the Gandy and Eureka were naturally late, but are shy bearers.

In the discussion of Mr. Lageman's paper, Professor Lazenby said that there are about two hundred kinds of weeds in Ohio. He divides them into three divisions, as follows:

1. Always injurious—nearly always imported weeds.
2. Usually injurious.
3. Occasionally troublesome.

Professor Lazenby suggested that the Society hold a meeting at Grove City sometime in the near future.

Mr. Sessions resigned as member of the Committee on Fruit Exhibits.

Mr. T. A. Scott was appointed to take his place.

Mr. R. J. Tussing reported on the condition of the Winchester Section, the burden of his report being that that division of the Society was about to become extinct.

Society adjourned.

## MARCH.

HORTICULTURAL HALL, O. S. U.

Meeting called to order at 2 o'clock P. M., by President Lazenby.

Committee on Fruit Exhibitions continued.

Under head of Botanical Observations, Mr. Janney said that he had noticed a crab apple tree showing color in the tip of the buds.

Mr. Fulmer said that the *erigenia* was out in blossom. White trillium also in bloom, and skunk cabbage in bloom two weeks previous.

Mr. Hine made his report as chairman of the Committee on Entomolology, which report is printed in this number of the Journal.

Professor Lazenby announced the course in Meteorology in the University, under the direction of J. Warren Smith, of the Columbus Weather Bureau. The lectures are to be on Tuesdays and Thursdays, at four o'clock. He also called attention to two papers that are of especial interest to horticulturists—*The Miami Valley Horticulturist*, published at Dayton, Ohio, and *The Mayflower*, edited by John Lewis Childs, and published at Floral Park, N. Y.

Mr. Scott asked if the peach wood was killed by the cold weather. Professor Lazenby said that many trees in southern Ohio were reported killed.

Mr. Lageman read a short account of the crocus, as follows:

"The small plant now found blooming here and there on grass plots, as in parks and gardens, is Crocus sartious, a plant which furnishes in its stamens the precious saffron of commerce, sometimes adulterated with other blooming flowers. It belongs to the lilies, having its bulbous root so deep in the ground that it is seldom destroyed by children pulling up the flowers, as it is done in Franklin Park. There is another kind of flower, under the name of saffron, in the drug stores, being a composite flower, Carthamais, which is used as tea for little children, as a sedative against cramps, etc.

Mr. Scott said that the crocus, when planted in the lawn will be in bloom and out of the way before time to mow the grass.

The regular program was then taken up, as follows:

" Forcing Rhubarb in the Dark,"........John F. Cunningham.
"Sources of the Ohio Flora,"..A. D. Selby and J. W. T. Duvel.
"The Metropolitan Park System of Boston," E. Meade Wilcox.

During the discussion of the paper upon the sources of the Ohio flora, Professor Kellerman said that he had been working on the Ohio flora for eight years. He said that the paper, as read, referred not so specifically to the Ohio flora as to the general flora of the United States. He corroborated the statement of the authors that there is an Appalachian region. He said, further, that the check list, as prepared by himself and W. C. Werner, contained about 200 plants that should be thrown out.

After Mr. Wilcox's paper was read, Professor Derby made some interesting remarks upon the park system of Boston.

Society adjourned.

JOHN F. CUNNINGHAM, *Secretary.*

# THE EDITOR'S TABLE.

This issue of the Journal begins a new policy in regard to general makeup. It will be noticed that we have made some changes in form and arrangement, and also that there are a couple of additions. The advertisements that we introduce with this issue are of reliable firms and individuals. Most of them are old and well known. Their advertisement appears here because it was their wish, and our acceptance of them upon our pages is proof that we consider them reliable.

The department headed "Good Things From Our Exchanges," is introduced with a view of presenting in a compact form the good things that come under our notice in our many valued exchanges. We trust that it will fulfill its purpose and that its appearance will be appreciated by our readers.

*The Miami Valley Horticulturist*, Vol. I, No. 1, comes to us from the Horticulturist Publishing Company, of Dayton, Ohio. It is an attractive publication of twelve pages, printed in good style, and containing articles of interest and value. Upon the front cover of the initial number appears the portrait of Mr. N. Ohmer, the genial President of the Montgomery County Horticultural Society for thirty-two years.

We wish the new publication all success in the treatment of "practical and decorative horticulture, beautiful homes, artistic lawns, birds, and good roads," which their announcement says is their mission.

The horticulturists of America are to be congratulated upon the character of the horticultural literature that is to be had. The periodicals that are devoted to this growing and prospering vocation are of a high order, and the greatest care and alertness is evident in their appearance. Such papers as *American Gardening*, *Gardening*, *Vick's Magazine*, *Meehan's Monthly*, and a few others are of the greatest value to those who receive them, or, perhaps we had better say that it is a great loss to him when the gardener does *not* receive these papers.

Several good books have appeared within the last year. Among these might be mentioned, "The Evolution of Our Native Fruits," by L. H. Bailey; "Bush Fruits," by F. W. Card; "Garden-Making," edited by L. H. Bailey; "Fertilizers," by E. B. Voorhees; "The Pruning Book," by L. H. Bailey, and others dealing with special branches.

In the mention of horticultural literature we must not omit the bulletins sent out by our experiment stations. These bulletins, which anyone may obtain free, are perhaps the most valuable portions of the up-to-date literature concerning crops, as they are accounts of actual tests in the field. Persons who aspire to thoroughness in any branch of horticulture or agriculture should by all means receive the experiment station bulletins.

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LANDSCAPE GARDENING—*As Applied to Home Decoration;* Samuel T. Maynard; cloth; pp. 340; Illustrated; John Wiley & Sons; New York; $1.50.

In this work Professor Maynard points out in a clear and happy manner how the people of this country may beautify their homes. Unlike most works on landscape gardening, it deals with the ordinary American home, its needs and requirements, and suggests in a sensible and practical way methods of improving and decorating the grounds and buildings.

The great fault with most writers upon landscape work is that they deal with parks and large public gardens, great estates, etc., and that their suggestions are out of the question for the ordinary householder. But as is shown by the author's dedication, this work is for "the thousands of home makers who are trying to beautify their own homes and thus adding much to our already beautiful and prosperous country."

In his treatment of the subject the author is quite complete. Beginning with a chapter upon "Landscape Gardening," and another upon "Ornamenting Our Homes," he takes the reader through the steps in home decoration in logical order. Preparation of the land; trees, their planting and care; shrubs, walks, drives; renovating old homes and improving them, are all ably treated. A chapter is devoted to "Insects Injurious to Ornamentals," and another to "The Home Fruit Garden."

It will be seen from this brief survey of the book that it is especially valuable to the housekeeper, and the untechnical horticulturist and farmer. While all statements are scientifically accurate they are clear and plain.

The book is very well illustrated with upwards of one hundred and sixty pictures, and through the agency of pictures and text combined one gets a clear understanding of the author's meaning. Our opinion of the book is that it is an unusually valuable and useful work, and should be in the library of all gardeners, farmers and home owners.

# GOOD THINGS FROM OUR EXCHANGES.

From the newspaper bulletins sent out by the Massachusetts Horticultural Society we take the following:

"We rely upon two humus crops, the early black cow pea and crimson clover. Early in August of the first year we sowed crimson clover seed all through the sweet corn at the last cultivation. We used about twelve pounds per acre and hung a small drag or block behind the cultivator, so as to scrape or level off the soil; then we let it alone. It came up in less than thirty-six hours, but it was poor, little stuff to begin with, and we lost faith in it fifty times before spring, and a dozen times after that. It hung on, however, and by the middle of May, stood a perfect mat eighteen inches high, all over the field. There was a great temptation to cut and cure it, but we reasoned that the soil needed it more than the stock, and it was all plowed under and rolled down before planting."
—*Herbert W. Collingwood.*

"There remains one question which comes to the front everywhere, and remains yet to be satisfactorily answered. It is this: What system can be devised that will enable the producer to get his proper share of the market value of his fruit? As it is a well known fact that much of the fruit sent to market is of inferior quality, does not the answer to this question rest first with the producer, requiring him to raise the standard of quality? This, with the regulation of transportation charges and commissions by organized effort and co-operation among those having like interests, the results of which are seen in other lines of industry, would go far toward answering the question of how the producer can get his fair share of the market value of his fruit."—*W. F. Tabor.*

"Potatoes were first introduced in 1628, but were not much grown in the early years of the colony. The first apples were gathered in 1639, and until after the Revolution this fruit was valued only for cider making, and the varieties grown were good for nothing else."—*Hon. Wm. R. Sessions.*

"It is time enough to thin your fruit after it has set in the spring. Large, fine fruit can be raised only when there is a moderate number of peaches on each tree. It takes from ten to twelve days to gather peaches which have come to maturity. Don't use a machine in sorting them. Hire bright, intelligent women; they are better than men as a rule. And remember always that there is more profit in selling fifty or sixty peaches to the half-bushel at two dollars, than one hundred to the half-bushel for fifty cents. There may be less nutriment and more water in the large species, but the people like them and will have them. As to the profit in peach growing, it depends on the individual. One must have a taste and love for the work to succeed in it."

—*J. H. Hale, on " The Way to Grow Good Peaches."*

"The increase of noxious insects which has been so remarkable during the last sixty years is the natural result of changed conditions. Among the principal factors tending toward it may be mentioned : (1) the massing of crops in limited areas ; (2) the facilities for transporting insects long distances by vessels and railways carrying agricultural products; (3) the abandoned farms and orchards that serve as breeding grounds ; (4) the destruction of forests and the cultivation of prairies ; and (5) the decrease of birds."—*Prof. Clarence M. Weed.*

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From Newspaper Bulletins of the Ohio Station we take :

"TREATMENT OF FROZEN TREES.—Peach trees which are from three to five years old and have never been pruned to any extent need special attention. In case the injury to such trees does not extend beyond the twigs and small branches, the best thing that can be done is to cut off all the branches to within one to three feet of the body of the tree. A tree five years old, which has been allowed to grow at will, may have long, slender branches, six to ten feet in length, with most of the fruit-bearing wood near the extremities. Such a tree needs topping, even if a crop has to be sacrificed in order to get it into proper shape. To cut out half the top from such a tree will improve succeeding crops and prolong the life of the tree."

" REGARDING THE PURCHASE OF FRUIT TREES.—In selecting varieties it is not safe to invest in any high-priced novelty. Take old varieties of known merits, only, and do not be cajoled into paying fancy prices for trees propagated by special methods nor because they are said to have certain merits not possessed by trees offered by other nurserymen. If an agent makes statements which seem to be extravagant submit them to someone who is experienced in such matters, and if the agent is found to be lying about one thing it is safe to infer that he may in others.

"Do not be deceived into believing that the small home nursery has no assortment of varieties. Most likely it has just what you want and at half the price asked by the agent."

"A difference in opinion exists as to the best time for cutting back injured trees; some growers prefer to have the work done before the leaves open, others choose a later time; but the safest way is to do it early. As soon as the degree of injury is known, therefore, we may wisely begin the pruning. If left till a later time, other work may crowd it out entirely, with the result that the orchard is lost. A saw and tree pruners are the tools to be used. It will be beneficial to carry along a keg of white lead and apply a coat of the lead to the wounds made. This will keep out the air, prevent the wood from checking, and retard evaporation from it. All pruned-off wood should be removed from the orchard and burned.

"The process here described will not save all the trees that have been injured, but if done with care it will save many, and those that die after the treatment is given will probably die in spite of it rather than because of it."

—*Kansas Station Newspaper Bulletin.*

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"Nature is opposed to labels. She has her own and they are all appropriate and beautiful. In stem, and leaf, in habit of growth, in time and character of bloom, in every little working root, in the flavor of the sap, in every tiny cell wherewith she builds a plant, she tells what the plant is. With a delicate but unmistakable tracery the Divine Florist writes all over, and all through, his flowers what they are, and nature resents as an intrusion that we should hang a billet of dead wood on a flower and scribble thereon 'Marechal Neil,' or 'Rat-tailed Cactus,' as the case may be."—*From "Plant Labels," by Mr. Woodson Walker, in Vick's Magazine for March.*

[The sentiment of this statement is admirable, but we do not all perfectly understand the language in which nature prints her labels.—Ed.]

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"Azaleas.—I am hoping, as the azalea season draws round again, that the people who buy handsome azaleas in full flower at market, or at a florists, will sometime learn to keep them in cooler rooms, so that their beauty may last longer. An azalea ought to be beautiful for a month or more, and to bloom finely for several, perhaps a dozen years, if its owner treats it right between blooming seasons. We bed ours out in summer, under a lath screen, along with tuberous begonias and other plants of that sort. The plants are not taken from their pots; the latter are merely plunged."—*From Vick's Magazine for March.*

## BIOGRAPHICAL SKETCH.

Gustavus Swan Innis was born February 4th, 1819, in Franklinton, and at that time the county seat of Franklin county, now the west side of the city of Columbus, and died January 2, 1899, at his home on South High Street, Columbus. Mr. Innis had vigorous health until the last year of his life, during which he was, at times seriously ill. Mr. Innis attended the public schools, and afterwards Central college and a school at Worthington. He taught school in what is now the south side of Columbus, and in early life showed a fondness for mathematics and studied land surveying, at which he was engaged in after life. Mr. Innis commenced the life of a farmer about four miles from Columbus on what was known as the Harbor road, now the Westerville turnpike. He afterwards bought a small farm which was then south of Columbus, but is now in the city, on which he spent the latter part of his life.

When the great rebellion arose, Mr. Innis assisted in organizing the 133d O. V. I., and was appointed colonel by President Lincoln. He was in command at Fort Powhatan on the James river, and was at the attack on Richmond, June 16th, 1864. Mr. Innis was during many years an active member of the Columbus Horticultural Society, and in 1882 was elected its president. He was earnestly interested in the improvement of the horticulture and agriculture of the country. He was also earnestly interested in education; was during ten years a member of the Board of County Examiners; was president of the Trustees of the Children's Home; a member of the State Board of Charities; in 1874-5 warden of the Ohio Penitentiary; in 1879-80 superintendent of the Reform Farm School for Boys; an active member of the Franklin County Agricultural Society; during about thirty-five years president or secretary of the Franklin County Pioneer Society; a member of the first Board of Jury Commissioners of the county; one of the building committee of the Mansfield Reformatory; president of the county board of visitors and member of the Association of Civil Engineers. He was also a member of the G. A. R., the Masons, and Odd Fellows. He joined the Town Street Methodist Church in his boyhood, and was a regular attendant at the South High Street Church since he lived near it.

J. J. Janney.

# COMMUNICATIONS AND DISCUSSIONS.

## THE PEDIGREE OF THE DAISY.

(*Chrysanthemum leucanthemum, L.*)

BY ARTHUR D. MASON.

In the days before the doctrine of evolution had originated, all we could say about our beautiful plants was that they possessed such and such shapes and characteristics; and if we had been asked why they were not rounder, or bigger, or of different color than they actually were, we could have given no sufficient reason except that they were so made. But since the great princple of descent with modifications has reduced the science of life from chaos to rational order, we are able to do much more toward giving it an explanation. We can now practically explain why a certain plant is so complicated and from what source the particular parts were derived.

Each of the present species of flowering plants is ultimately descended from the common central ancestor of the entire flowering group of plants, and each has acquired a new diversity of structure or appearance for some definite and useful purpose. As a rule, traces of the various stages through which every species have passed are still visible in the existing species, and it only requires a little care and ingenuity in comparison and analogy, to unravel the characteristics of their ancestors, and thus describe their pedigree. The ancestry of plants is traced out in practically the same manner as animals, even to the human race. Even without their history we would know that the people of southern Canada were descendants of the French, simply by their existing characteristics.

Biology of late years has shown that every living thing has been slowly molded into its existing shape by its surrounding circumstances, and that it still bears upon its face a thousand traces of its earlier stages. Take the peculiarly shaped petals of a flower, or the spurs of a violet, for instance, and the questions arise, What are they for? Why did they originate? These can be explained only by their development in connection with the development of their environments.

I will take the daisy as an example to illustrate when and why certain parts of flowers were formed, because it is the most complex in form and has greatest connection with its companions in the field. At a rough glance it appears as a single flower with many petals, but such is not the case as each of the yellow petal-like structures, which compose the head, are complete flowers in themselves. Of these there are two kinds. The outer florets consist each of a single long, white, sometimes pink-tipped ray; the inner ones consist each of a small golden bell-shaped blossom, with stamens in the center, surrounded by a yellow corolla much like that of a Canterbury bell in shape.

The daisy belongs to the large family Compositæ, all of which have their flowers clustered in similar heads. If you will look closely at one of the middle florets of a daisy you will find that the edge is divided into four or five teeth. These teeth clearly point back to a time when its ancestors had five separate petals on each flower, or to go further back we may conceive of them as consisting of only a head without even petals.

If you will take a butter-cup or a lily, you will notice in the center of the flower a bunch of yellow spikes, which look as though they were there only to add attractiveness to the flower, but really they are the essential and only indispensible parts of the flower. These are the stamens and pistils. The petals have no particular value, and a flower may even live without them, as do the pines and oaks. Indeed, flowers do exist which have only one stamen or one pistil, but for reproduction both are necessary, as the pistil is the seed vessel in its earliest stages and the stamens manufacture the pollen which fertilizes the seed. The flowers bearing the pistils may be on a separate plant from the ones having stamens, or the two kinds may be on the same plant, but the greater part of our flora have both pistil and stamens in each flower.

The simplest and earliest blossoms then were very small and inconspicuous, consisting of a single stamen and a single pistil. Of these simplest and earliest forms, luckily a few remain to the present day and have greatly aided in determining the ancestry of certain existing species. When any one form develops slowly into another, it does not generally happen that the parent form dies out altogether, but usually lingers on somewhere, in some obscure corner, till science finds its proper place in the scale of development.

The duck-weed which is found in ponds of stagnant water is a member of this old type that has failed to develop into higher forms. It consists of a slimy mass of green filament with roundish leaves which float on the water and bud out at the side, producing new leaves until it covers large areas of water. It has no root, no stem, no branches, no visible blossom, or apparent seed, but under the leaves little yellow specks may be found near the edge of the leaf. These specks are the flowers, yet they consist of only one pistil and one or two stamens. The pistils have true seed and the stamens true pollen.

The reason why this simple plant has descended to us in its primitive condition is due to the fact that, as it grew exclusively on the water it was not crowded out of existence as were most of the terrestrial forms of early plant life.

Probably the compound structure, which the daisy and other members of the composite family now have, was brought about by the increase in number of carpels in the pistil, also of the stamens, and that stamens eventually grouped themselves about the pistil divisions in numbers according to the whole number of stamens.

The daisy has at sometime in the past arranged its parts in layers of five each, while at about the same time the lily ancestor formed rows of three, and of this ternary arrangement all their existing decendants still bear similar traces. In fact, most of the flowers of the present time show clear signs of being derived either from the original five-stamened or three-stamened blossom. The very primitive five-parted common ancestor of the daisy, rose and butter-cup was an extremely simple and inconspicuous flower. It had merely green leaves and plain stems surmounted by a row of five or ten stamens inclosing five or ten carpels. Perhaps beneath those may have been a little row of cup-shaped bracts which have since developed into the calyx. It had no bright-colored petals. The origin and shape of the petals which afterwards appeared was due to the relation which existed between them and certain insects.

No pistil ever grows into perfect fruit or sets good seed until it is fertilized by a grain of pollen from a stamen of its own kind. In the simplest flowers the pollen is allowed to fall directly from the anther to the pistil of the same flower, but plants thus fertilized are not as strong as those which are fertilized by the pollen of another. Hence, any early plant which happened to be so constituted as to allow of easy cross-fertilization would be certain to secure stronger and better seedlings than their self-fertilized neighbors ; and whenever any peculiar form or habit has tended to encourage this mode of setting seeds the plants have always prospered and thriven exceedingly in the "struggle for existence" with their less fortunate congeners.

This cross-fertilization cannot exist without the aid of some agency outside of the plant itself. The wind and insects are naturally the greatest of these agents. The pollen grains being so light that they are carried by the wind to the specially constructed pistils where only a few of the original number of grains can do service; thus few seeds will remain unfertilized when it is left to the wind to do the work. The flowers which have adopted insect pollenation have made the greatest change in so doing of any of the changes that have taken place in the evolution of any flower. From the very first, insects must have been very fond of visiting flowers for sake of the pollen, which they used to eat without performing any service to the plant in return as they do in the case of wind pollenized flowers today; so, to prevent this bad habit on the part of the insects the flowers seem to have developed other attractions for the marauders. Accordingly honey was produced in the base of the flower, and the insects in securing it would cover themselves with pollen and transfer it to other flowers. Thus the plant turned a harmful insect into a useful agent, and when once the plant took to producing honey the insects partially gave up their habit of pollen eating and went from blossom to blossom in search of the sweet nectar instead.

With this change from fertilization by wind to that of insects there came in another improvement. The primitive flowers which probably consisted of nothing but stamens and pistils now began to turn the outer row of five stamens into petals. This tendency of stamens to produce petals still exists and is employed by florists in producing double flowers, but even now there is still left a trace of the stamen in the form of the petal. These bright colored petals not only made it attractive to the insects, but also aided them in securing the nectar.

The plant, to further protect itself, gradually deepened the tube of the corolla until it consisted of but one petal, yet leaving the marks of the original number. This deepening caused the honey to be deposited so far down that only those insects whose mandables were longer than usual could obtain the desired honey; also, the stamens were so placed that in trying to get the honey the bee or other insect's head would brush against the stamens and in that way pollen would be carried from plant to plant and perfect cross-fertilization would result.

The daisy has taken one more step in advance which brings it up to the highest place in the plant kingdom. At first thought one would say that our forest trees are more highly developed than the daisy or any other of the compositæ, but such is not the case, as they are among the lowest of the Spermatophytes. This last step which has been made is the change in color of the outer rays from yellow into a pure white or a slightly pinkish or bluish tint, which might have been simply a transformation to beautify the plant and a means of indirectly helping in its struggle for existence.

The daisy bears the same relation to other members of the plant world as man does to the lower forms of animal life, that is to say:

The daisy once was plain and small,
But now it's structure rivals all.

## THE ORIGINATION OF NEW VARIETIES BY THE HORTICULTURIST.

BY JOHN F. CUNNINGHAM.

Perhaps it may seem that if we are to speak very specifically and accurately concerning this subject, rather than generally, or in common terms, we should begin by changing our subject. The "*origination* of new varieties" is hardly the exact way to express it, since the gardener does not himself originate the variety as a usual thing, but more often he takes advantage of some new feature that nature has originated in the plant, and by artificial means fixes it as a permanent feature of the plant. Again the first variation in the form of the plant, or any variation in root, stem or foliage, may have been induced by the gardener with the distinct desire of starting something new, or trying to achieve some definite ends. Be this as it may, we mean by the term "origination" of a variety, the person who by observation, care and watchfulness rears up a new form of plant or fruit and presents it to the world for a particular use.

Perhaps it would be well if we should define our term "variety," before proceeding further. When we speak of a variety, what do we mean? This is a much mooted question for the practical gardener, as time and time again, when a new form is introduced and named the originator is disputed, his variety name challenged, and he is told that he has renamed an old variety. He knows he has not re-named an old variety, for his form was originated and propagated upon his own grounds. But let us look at the matter again. In her eccentricities nature is prolific of new forms. Variation seems to be the rule rather than the exception, and thus it is the nature of the plant to vary. It is well known that each set of conditions is productive of adaptive changes in plants, or that each plant adapts itself to its conditions. This being true, and it being plain that there are no two places where the conditions are exactly the same, it will be readily seen how variable the vegetable kingdom must necessarily be.

Having such an endless variation then among the individuals, what shall constitute a variety? I think that we can say without great error, that where the individual differences are so well marked as to be readily distinguishable, and where they will pass practically unchanged down to several succeeding generations, we have a variety, and where these characters are still stronger we may have a species. The line between the species and the variety cannot be accurately determined, and likewise the line between variety and individual. No one can say, "here the variety ends and here the species begins." In the words of Asa Gray, "Species are judgments," and it lies in the agreement of man where a species shall exist and where it shall be called a variety. If this were not true how shall we account for the fact that far greater differences often exist between cultivated varieties than between natural species? We cannot agree with the older botanists that there are as many species now as "there were different forms created in the beginning," but we know as a matter of horticultural experience, that new forms, new varieties and new species have been made and are being made today. This leads us then to the formation of new varieties under the hand of the horticulturist.

Does the horticulturist really originate any new forms, or does he merely propagate them after having discovered them completed by nature? I believe that all persons will agree that the great majority of our temperate fruits have been reared from unpromising and unattractive pregenitors, and that it is entirely due to the skill and care of the gardener that we are able to gratify our palates with a luscious pippin, a gorgeous plum or a delicious grape. Again it may be said to be true that those varieties, artificial as they are, depend greatly upon the artificial care for their existence. (The statement has been made, and upon very good authority, that should the cultivation of wheat be suspended for the space of three years the wheat plant would become extinct.) Did you ever notice the difference in the quality of different individuals of the same variety, one of which has been well cared for and the other has escaped from cultivation, and also how much more marked their difference becomes as the "escaped" plant has to shift for itself more and more? Or take a more stable example in examining the old apple trees that may stand in the abandoned orchard; it will be readily noticed that the lack of care has a marked effect upon the plant as it already exists and has its start. Now, if these conditions are so apparent in the retrogression of plants, why should not they hold true to almost as great an extent in the improvement of the plant under more favorable conditions?

In the work of the origination or formation of new varieties of plants and fruits the principal factors entering are: Variation, Selection, Fixation.

Variation in the parent plant must first be induced in order that the cultivator may have material to make his selection from. In order that any new forms may be started it is readily seen that the type of the parent plant must be broken and an unstable character of the plant produced. This may be done in several ways, the most important of which are: 1. The variation of the food supply. 2. A change in the climatic conditions governing the plant. 3. To induce by some means a severe struggle for existence.

The first of these is, generally speaking, by far the most important, and is most commonly made use of by gardeners in breaking the type in order that new selections may be made. The food supply may be increased in many ways—by actually increasing the amount of available fertility in the soil, by setting the plants by themselves, by thinning and cutting away certain portions of the plant, etc.

Variation itself is sometimes a means of augmenting the food supply in certain classes of plants, in allowing themselves to avail themselves of different environments and conditions. Downing says, in regard to this point, "The more diversified the descendants from any one species become in structure, constitution and habits, by so much will they be better enabled to seize on many and widely diversified places in the polity of nature, and so be enabled to increase in numbers."

Climate may greatly modify plants in many ways, such as form, size, proportionate fruitfulness, leafiness, etc. Thus the vegetation of the tropics is large and rank, while there is a gradual diminishing of size toward the poles and a gradual increase in proportionate leafiness and fruitfulness.

The increasing severity of the struggle for existence will actually change the form of plants and increase variation. Each plant fills a niche as compared with other plants. For instance, in a field sown as thickly to wheat as it will stand, there is still room for clover and weeds. In a forest standing as thick with trees as it can stand there is still room for underbrush and vines. Thus it will be seen that variation may be induced in many ways, and of all the gardener may take advantage.

Having induced variation, having broken the typical characters of his parent plant, the next step of the gardener is the selection toward his ideal. This is a most important matter, and the selection must be rigidly kept within the limits of his ideal. Here is where the science and art enter in, and at the same time, where many failures occur.

The effect of different ideals may be seen in every-day horticultural experience in the variation of a new variety in a few seasons after its introduction. A new variety of tomato may be propagated until ninety per cent. of its progeny will "come true" for the originator. The seed is sent out over the country, and grown and selected by different parties for a number of generations, and each person's ideal will be a little different. Should the seed be collected after a few years and planted, the result will probably be as many kinds as there were growers and selectors. It will be said then that the variety was not fixed, and in all probability, in his haste to introduce it, the originator had not grown and selected under his ideal until the characters had become sufficiently strong. This then is where the great care should be exercised in the formation of new varieties.

Many seem to look upon the formation of new varieties as merely a matter of chance, a matter to be wondered at rather than to be explained in a rational and practical manner; but there are those who are far from reliant upon the smile of fortune, who make the work of originating new varieties their life-work, and they go about it systematically. Take for example Mr. Luther Burbank. Concerning his work, Carl Purdy wrote in *The London Gardener:*

"His knowledge of plant variation is so excellent, and his actual experience so wide, that the production of a novelty, instead of a chance in thousands, obtained by haphazard methods, is a matter of definite aim, approached with a wide knowledge of the constituent elements and with a very encouraging probability of success."

It is claimed by many, and justly, we believe, that the originators of new forms should have the same protection as persons inventing new mechanical devices. In defense of this opinion, Jacob Moore, of Athens, N. Y., wrote:

"The protection of originators would be the protection of planters against frauds," and again, "Precisely the same power has the originator over his new fruit, it is in his power to destroy or disseminate it. If he consents to the latter course he should be given such exclusive rights therein as will enable him to obtain compensation."

*The California Fruit Grower* said: "Only a few people comprehend the marvelous patience, the rare skill, the close attention, the hard work and the cash outlay necessary to be a successful fruit variety originator."

We may say then, in conclusion:

The origination of new varieties to suit special needs is a systematic operation, not altogether dependent upon chance.

The chief factors in the process are variation, selection and cultivation.

It takes the greatest care, skill and patience to be successful in the work.

The originator of a new variety deserves the same credit and protection that is received by an inventor.

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## HORTICULTURE FROM A COMMERCIAL STANDPOINT.

BY L. K. SUTTON.

The business of growing fruits and vegetables for commercial purposes is constantly changing and the field for operation widening.

Education comes first in the fruit line. We have no trouble in trading with the educated grower, but its different with the uneducated. The grower who reads, studies and travels, knows how to grow, gather, prepare and ship his fruits. If ready to sell, always has a price, is not excited if a dealer calls to purchase a portion or all of his crop. The successful fruit grower subscribes for and has time to read some of the leading journals in his line; studies the situation, does not rush in and plant all the new varieties simply because some fluent agent with colored plates calls and tries to pursuade him that he can grow on his soil and produce as high colored fruit as shown in the catalogue. Columbus is our home, and will tarry here a few moments. Our city is a consuming city in nearly all lines, very seldom enough fruits or even vegetables raised here to supply home demands. Our horticulturists and gardeners are a little slow; our dealers must depend largely on Cincinnati and Toledo for their cucumbers and radishes; bad management here. Last summer our market drew on Cincinnati for as many as eighty barrels of radishes per week, during height of season. Now if money for the gardener there, why not money for our home gardeners, not counting express charges and packages.

We could help supply Cleveland, Pittsburgh and smaller northern Ohio towns if only our gardeners would grow them. The same can be said of nutmeg melons; no soil produces finer flavored (excepting Colorado), and as for tomatoes we stand at the head. Nearly all the leading varieties were originated by the late A. W. Livingston, of our city. A canning factory is needed here. We have the soil, can grow the goods, cheap labor, railroad facilities and plenty of capital. Only one thing is needed—co-operation. The demand for canned corn and tomatoes is increasing every year, also for pickles, and the margins have been quite large the past three seasons. A good opening here for a live firm.

There is no use denying the fact that all branches of farming or fruit growing have suffered during the past three years. Now, how to overcome it or improve is the question. I am acquainted with one gardener whose rule is never go to the city without taking something to sell. That man saves money every year ; again, plant only what you can properly cultivate. Let the varieties be of such a nature as suits your soil and pleases your customers. You should not become discouraged because your Ben Davis apples are not like those grown in Kansas in size, color and flavor, or like the Baldwin of the Eastern States, or the Belleflower of Oregon and California. But you can raise the Red Astrakan, Maiden Blush, Grimes' Golden and Rome Beauty here by spraying every year and cultivating and enriching the ground by phosphate, lime, ashes and well rotted manure. How can you expect to have a crop of apples if you allow your orchard to grow in sod, seldom pruning, and occasionally a partial attempt at spraying. There is nothing mysterious about the success of the fruit growers of the Pacific States. In the first place they take pains to produce high grade fruit, then pack in new boxes of convenient size, in the most attractive manner, and when you please a buyer's eye the sale is half made. Wrap your fruit, if necessary; pack honestly. If it pays California growers to buy colored paper in which to wrap their fruit it will pay you, and the freight is saved. Try a box on the market and see.

We have never had too many choice strawberries, nor apples, peaches and pears. Our market is often glutted with over ripe fruit and inferior quality ; prices low some days, of course, but we cannot control the weather, nor people's appetites. The good fruit is always quickly taken. It costs more to pick a quart of small, soft berries than a quart of nice, large ones. Don't over plant, but try for size every time. What is the use of sending North, South or East every spring for new varieties of plants, at a high price. You have the soil and time, why not originate some new varieties yourself and sell some. Keep your money at home and get a little of somebody else's. If it pays them it will pay you, try it. Organizations, clubs, associations are good in their place, but they are becoming a " fad " in all lines, and if this craze is kept up the ordinary man will be kept busy attending meetings. Individual effort is what is needed to make anything successful. Try it on the farm.

We believe the fruit grower should be governed in his planting by his nearness to market. Some varieties of fruit can be grown successfully and yield good returns if hauled to market in a wagon and sold same day as picked; while the same fruit if compelled to be shipped by express a long distance to find a market is almost valueless.

### PREPARING FRUIT FOR MARKET.

Put the best and highest colored fruit on top every time, people look for it there, you would simply be called slow if you didn't. You can hold your trade and reputation if you will have your fruit as good size through the box or barrel, even if color is lacking. It's the habit of putting fine fruit on top of package, then filling in with over ripe or small and knotty fruit in balance of measure, that hurts. Put up your fruit in such a manner, with your name attached, that a customer who buys once will call again and ask for that particular brand. If your fruit is entitled to be marked 5 X, put on the X's, if only X, then so mark it; customers respect you. Put your ripe fruit, as near as possible, in a crate and mark it ripe; also separate the seconds from the first and mark them accordingly. Strawberries, apples, grapes and oranges are in demand the year round; other fruits, as a rule, in their seasons.

There is a growing demand for late strawberries. Now the horticulturist who can produce a late-bearing strawberry will have a demand for all his berries at good prices, and an outlet for the plants.

The recent severe weather will cause numerous changes in the plans and prospects of many fruit and vegetable growers in nearly all sections. Many peach orchards that promised a large yield in January, are blighted now, and a substitute must be found to supply demand. A dish of berries, an orange, bunch of grapes, a banana or piece of melon before breakfast is a relish and serves to sharpen one's appetite for the more substantial foods to follow; but not so with a peach, when you eat a peach there is generally a less demand for the more solid foods. Peaches seem to supply or contain bread and meat, and a crop of peaches affect the sales of meat and groceries more than any other variety of fruit. So you can readily see the effect the loss of a peach crop has on the market. It will require more berries, corn, tomatoes and potatoes to supply demand, than if crop of peaches was safe. Stringent times, like all branches of industry have passed through during past three years, causes uneasiness in all lines. In some cases, profits small, others none, and in many a loss has been incurred. Farmers want to change for something that will bring in more money and less work. Men in business in cities were trying to sell out and seek other lines for investments, nearly every one wanting to find means of making money rapidly and take life easy. The shrewd business man, whether on the farm or in the city, will take advantage of these times, and profit by the mistakes of others. Fruit growing and farming will yield good returns yet; a good time to plant raspberries for those who have the soil to produce them, also tomatoes this season. Give a little extra cultivation to every field; try to grow such fruits and vegetables that will give you a wagon load every day when market season opens; the time will be used on half a load anyhow, and the careful grower will manage so as to have a full load every day. It is the constant adding that fills the purse.

## PLANS FOR THE SEASON OF 1899.

### BY ED. S. TUSSING.

The question, what to plant and how to operate, is one that perplexes the market gardener more and more each succeeding year. This is truly a world of producers, and competition has become so great that it would seem, sometimes, but a question of the "survival of the fittest." Facilities for transportation have become such, that large growers of Chattanooga and other distant points can gather their fruits, etc., on Monday morning and Tuesday morning it is on the Columbus market; nearly as quick as the grower fifteen or twenty miles away can haul his products to the market. Thus we must compete with the Southerner in spring, and the Northerner in the later season.

Because of the rough handling in shipping, perishable crops must be gathered too green to be good, or if allowed to ripen before shipping, are in bad condition when the market is reached. This foreign truck is not to be compared with fresh, home-grown, usually, but so much of it is put on the market, that, quite often it has the effect of reducing the price on the good article below the cost of production, or to the extent that it is unprofitable to grow them.

Were I located within a few miles of the city I would grow a full line of berries and vegetables and would retail direct to consumers, from the wagon, as there are too many dealers between the producer and consumer. Our present retail markets are no longer to be relied on, as the peddler and the local meat and vegetable markets are taking their place.

By growing successive crops, beginning with strawberries in spring and extending to late in the fall, supplying regularly, customers with choice, fresh berries and vegetables, I should expect to dispose of good crops to good advantage. I do not think I would grow such root crops that must be marketed in winter, but would let the other fellow grow those, as I think the land can be used to better advantage, and the time also, in preparing and arranging for the next season's operations.

Being located, as we are, some distance from market, and owing to the unreliability of the retail markets, we must grow such crops that can be sold at wholesale to best advantage. To do this I have decided to make some radical changes, not changes either, but to drop quite a number of varieties we have been growing and push more determinedly those crops that pay us best. In the main, early crops, and those that cannot be carried into our markets by rail in the best possible condition, viz.: berries, tomatoes and melons.

In strawberries I shall not want less than one nor more than two acres. To have less would not furnish sufficient amount to justify us in going the great distance to market, but two acres, with a good crop will furnish all that can be disposed of to good advantage. Of all the varieties I have grown, the Haverland pollenized with Lovett is most profitable, and I shall plant more of those than all others. There are others of better quality, but we are growing for profit and will operate from that standpoint. I shall not, however, discard the Bubach and Warfield. Am trying for the first, a few plants of Bismark, Hall's Favorite, Star, Carrie, Wm. Belt, Brandywine, Clyde and Glen Mary, that all promise well except the latter, which made a poor growth, but I shall not plant largely of any until I note their fruiting qualities. Have learned by rich experience not to plant largely of anything until fully tested.

Raspberries I am obliged to drop entirely. Anthracnose, blights and ruinous low prices have done the work. Have sprayed some to prevent the diseases, but found it impractical.

Blackberries have proven more profitable with us than either strawberries or raspberries, until last season the extreme early drought practically destroyed them. One to two acres is as much as we can handle to advantage, with Snyder, Taylor and Ancient Briton the varieties.

With vegetables, cauliflower and early cabbage have been among our principal crops. The former usually, proved to be profitable, but the past season, of six hundred plants set early and six hundred late, not a single head was sold and only enough used on our table to remind us of its edible qualities. So we will drop it entirely because of the uncertainty to produce a crop. We fear we shall be obliged to do likewise with early cabbage; early in the season it is injured by what I suppose, from all accounts, to be anthracnose. The stems on inner sides of leaves and heart of plant have the appearance of being eaten by cabbage flea. I have closely observed, however, that such is not the case. The heart is injured to such an extent that a gnarled and twisted growth is the result; many plants are apparently destroyed entirely, but it finally throws out one to a half dozen sprouts. By removing all these but one we usually get a small head from each plant, but after the price in market is so low that it is unprofitable. The same may be said of late cabbage as of cauliflower, almost. The harlequin bug, also, made its appearance in our patches in small numbers the past season. These conditions, with the great competition from the South in spring and from the North in the fall have almost persuaded me to quit the cabbage business entirely.

Beans and peas I find unprofitable, also, because of the foreign competition, as they are shipped from the South by the car-load, and the principal part of the labor attending the crops, that of picking, comes at a time when we are in berrydom.

With potatoes, blight has become so prevalent that I find it best to plant only early maturing varieties. The Early Ohio has proven best with me, and are put on the market as early as possible, to take advantage of the better prices.

With tomatoes, bacteria and blight have become so prevalent I am convinced that only by heroic efforts can we hope to be successful in the future. All our patch, except one row as a test was sprayed the past season. While no decided results were obtained, I expect to continue spraying another season at least. If we must spray, I find it can be done more thoroughly and much easier if the plants are trimmed and tied up. If the plants are allowed to trail on the ground many of the leaves and fruit cannot be reached with the spraying material. The question here arises, does it pay to trim and tie up? I tried the past season, in a small way, to determine this. The result may not be uninteresting. Earliness is the first consideration with us in tomato culture, and the test was made to determine whether we could really get them earlier by trimming and tying up, and to determine the difference, if any, in the amount of fruit gathered from each system. One row containing just one hundred plants were trimmed and tied up; two rows alongside containing the same number of plants—for they must be set twice as far apart in the rows—were allowed to spread over the ground at will; all were sprayed alike, with apparently no benefit, however. For lack of time the record covers the first three weeks of fruiting, only, from July 8th to August 1st. From those that were trimmed we picked seven hundred and sixteen specimens, weighing two hundred and sixty-three pounds; from the others, seven hundred and seventy-four, weighing two hundred and sixty-three pounds. Sixty-four more were gathered from the vines not trimmed, but the weight was exactly the same. Had they been put on the market separately, nearly twice as much would have been realized from the staked vines, as those that lay on the ground at that particular season were badly discolored.

A great deal of time and labor is required to stake and trim up a large number of plants, but a considerable amount is also saved in picking and preparing for market. So, everything considered, most of our vines will be trimmed and tied up. Livingston's Beauty, with a few of the Stone for late planting are the only varieties for us.

For table corn we shall plant about one acre each of Adams' Early, Russell's Prolific and Egyptian, at intervals of two weeks, in the order named. Some might object to these varieties, but remember we are growing for profit.

With musk melons I have some misgivings whether the crop can be saved from blight, bacteria, etc., by spraying. Ours were sprayed faithfully the past season, except that possibly we stopped a little too soon. We kept up the spraying until we had gathered considerable fruit, but partly because of the busy and rainy season we stopped. Am now convinced that we should spray till near the close of the season, and if rainy weather, spray the oftener. Neither should we leave rows through the patch without spraying, to determine whether it is effectual. I shall determine that hereafter by the other fellow's patch that is not sprayed. The past season the blight first appeared in one patch on one of these rows; in the other patch it started at one side where the spraying was well done. So, I conclude, it is not entirely effective. The blight spread all over both patches from these points, but it was to be seen plainly that when it reached those unsprayed rows it followed them and spread more rapidly.

I shall plant almost entirely of Hackensack and Tip Top, in spite of the Rocky Fords, Paul Rose, etc. Those may do for the shipper, but we sell by the barrel, and those are too small and the quality is no better under like conditions. I conclude this from having one hundred hills planted at one end of our patch of Tip Tops the past season.

Early cucumbers usually pay well, but because of blight and the great amount of time required to gather them and the very low prices, I shall not plant any for pickles. For slicers we plant only Early White Spine.

As we think we have some land especially adapted to onion culture we have for several years been trying to grow them by the new method, so called. They do well until about half grown. When a good crop seems assured, blight strikes them and our hopes "go glimmering." So, we have concluded to drop that branch of our business also.

Summing up, our plans of operation will be as follows: To early potatoes will be planted two acres; tomatoes and early cabbage, one acre; melons and cucumbers, three acres; sweet corn, three, and field corn, five; blackberries, two acres; strawberries, four acres—two for cropping this year and two planted for next year's cropping; and five acres in wheat. This leaves our orchard of two acres, and twelve acres for hay and pasture.

Nearly all these crops will be pushed as much as possible for early market.

Our fruit, tomatoes, melons and cucumbers must all be sprayed faithfully till late in the season.

All this, including some plant trade, the care of our poultry and live stock will require the assistance of two hired men the greater part of the season, and I am quite sure none of our time need be spent at the ball park, the ring-side, or attending other necessary evils, but by close application and hard work throughout the season we shall hope to gain a fair competence as a reward for our labor.

## ALL KINDS OF WEEDS.

BY J. H. LAGEMAN.

What are weeds? Any herb which becomes a nuisance is a weed. This is the best answer I can give. But when our friend in W——— counts the trillium or wake-robin and the blood-root to the weeds, so I believe his definition of weeds must be the same as wild flowers. The botanist does not know, *i. e.*, acknowledge any weeds, he knows only flowers, but the gardener and farmer know weeds—*Unkraut* in German—well enough.

Where did the weeds come from ? Have they always been so numerous in this country as at the present time? At first I will answer the question, Where did the weeds come from? Perhaps someone answers, "Made in Germany." Somewhat correct, my friend, but not quite. We have got them here, too, they are not all foreigners, as our grandfathers. But let us see how many of them are imported, better, introduced from Europe. Let us look once into Gray's Manual of Botany and take a review of nine orders of plants, the most numerous:

From 56 Ranunculaceæ or out of the Crow-Foot Family 20 are from Europe.

From 70 Cruciferæ or the Mustard Family, 31 are from Europe.

From 53 Caryophyllaceæ or from the Pink Family, 37 are from Europe.

From 119 Leguminosæ or out of the Pulse Family, 22 are from Europe.

From 90 Rosaceæ or the Rose Family, 20 are from Europe.

From 48 Umbelliferæ or out of the Parsley Family, 8 are from Europe.

From 430 Compositæ or Sunflower Family, 40 are from Europe.

From 85 Labiatæ or out of the Mint Family, 30 are from Europe.

From 40 Polygonaceæ or out of the Knot Weed Family, 20 are from Europe.

So there are out of 1,000 American native plants about 228 European foreigners. But are they all weeds, *i. e.*, unkræuter or plants that become a nuisance? No, many are far from it, as there are among them our parsnip, parsley, cabbage, mustard, flax, buckwheat, alfalfa, giant clover, etc., with one word our best vegetable, and fodder plants, while others are modestly blooming and improving our crude soil. Only a few have become troublesome, like some of us have become very bad boys, "different from their imported grandfathers, too."

Among those that have become bad weeds are the well known wild carot, burdock, Russian thistle, and others. I have heard farmers in the West sow the Russian thistle, as it grows in the poorest soil and gives an excellent fodder plant for the cattle. So we see even the roughest foreigners will do well under certain circumstances as, *i. e.*, they make good soldiers.

It is a fact, that many imported herbs grew in the sea climate of Europe less tall and more harmless than they do here. Why should we complain about the humble violet, mignonette, field daisy and dandelion as weeds from Europe, when our ragweeds are reaching eighteen feet; our nettles, ten; our Spanish needles, eight, and our tick-treefoil and others, six feet in height? Our weeds can beat the weeds in the whole world.

But how were the weeds imported? The seeds of them were in the seams of clothes, boots, shoes, in the food and grain for the household and cattle, in furniture, etc. As for instance, the seed of the American fleabane *Erigeron canadensis* came in a stuffed bird in 1655, into Paris in France, and spread from there in a few years over whole Europe into Siberia. In like manner the American sunflower, our oxalis, pokeweed, and many others came into Europe.

But what was the cause, that the imported weeds got here so troublesome, even more than in other countries? Well, I must give a candid, although grievous answer. People have killed thoughtlessly the most useful helpers in destroying the increasing weeds in this country. One of the best weed-destroyers was the American migratory dove, that used to come every year in great flocks, miles long and one-half mile wide, as Audubon and Wilson describe them, that they were going from place to place, destroying all kinds of seeds, but mostly of weeds. So did the flocks of blackbirds, as I saw them yet in 1874, in the suburbs of Cincinnati, where they were roosting every night in the late part of the summer, near the Protestant Graveyard on West Walnut Hills, and so here in Columbus in 1878, in Parsons' Grove, near the Blind Asylum. So you would see swarms of finches, bobolinks, etc., till an unmerciful slaughter by thoughtless people made them nearly all disappear forever. This same thing is done by the pot-hunting, all kinds of bird catching and devouring Italian people, when the northern birds from Germany, France, Sweden and England are withdrawing through that beautiful country with the most miserable people, into warmer countries. The birds are caught in nets by people of the highest ranks and murdered for the table or for the foolish ornament on bonnets. Northern Europe protests without effort and success, because they are not harmonious enough with their protest. Brother John is always absent at, such meetings, because he has no taste for sweet-singing birds, but only for sweepstakes and land-grabs.

But, let us ask, what is to be done now to stop the progress and increasing of our troublesome weeds? Must we import more finches or grain-eating birds? By no means. I think the mistake to import the English sparrow as an insect destroyer, while he is nothing but a parasitical, thievish and quarrelsome fellow that drives away our insect-eating and also weed-seed destroying, native birds is great enough. Let us rather protect our weed-destroyers, the finches, the redbird, blackbird, bobolink and wild pigeons, quails, etc. But especially let us take the trouble to cut down the weeds of all kinds before their seeds are ripe, and not, as our ordinances often do, come too late and cut when the seeds have been scattered.

## FORCING RHUBARB IN THE DARK.

BY JOHN F. CUNNINGHAM.

Forcing rhubarb in the dark is a new industry. This crop has been forced for some time, but in the old methods of forcing the operation was carried on in this way (We quote from a very recent work, "The Forcing Book," by Professor L. H. Bailey, of Cornell University) "Thoroughly established clumps are dug in the fall and these are packed in beds underneath the benches, sifting the soil in tightly between the clumps, and then covering with from two to six inches of soil. The temperature should range as for lettuce and roses, or for very quick results it may be considerably higher. The length of time required for securing the salable product is about the same as for asparagus, or a little longer. About four or five weeks after the planting under the benches is the usual time required for the first profitable cutting. Paragon and Linnæus varieties may be used for the earliest results, but the best crops are to be obtained from some of the larger kinds, like Victoria and Mammoth."

That forcing in the dark is something new is shown by the fact that the "Forcing Book" has nothing to say about it.

At first thought one would think that rhubarb grown in total darkness would be spindling, white and unpalatable, but the reverse is true. The stalks of the exhausted roots, to be sure, are slender and spindling, but the "first fruits" are far superior in every way to the product as grown in the light. Its quality is better, its color is better, it has a thin and tender skin and is deliciously brittle.

The stock of the dark-grown product is even stronger than that grown in the light, since none of the strength goes to leaf growth. Light is necessary for a leaf development, and thus all the strength that would otherwise go into the leaf, goes into the stem.

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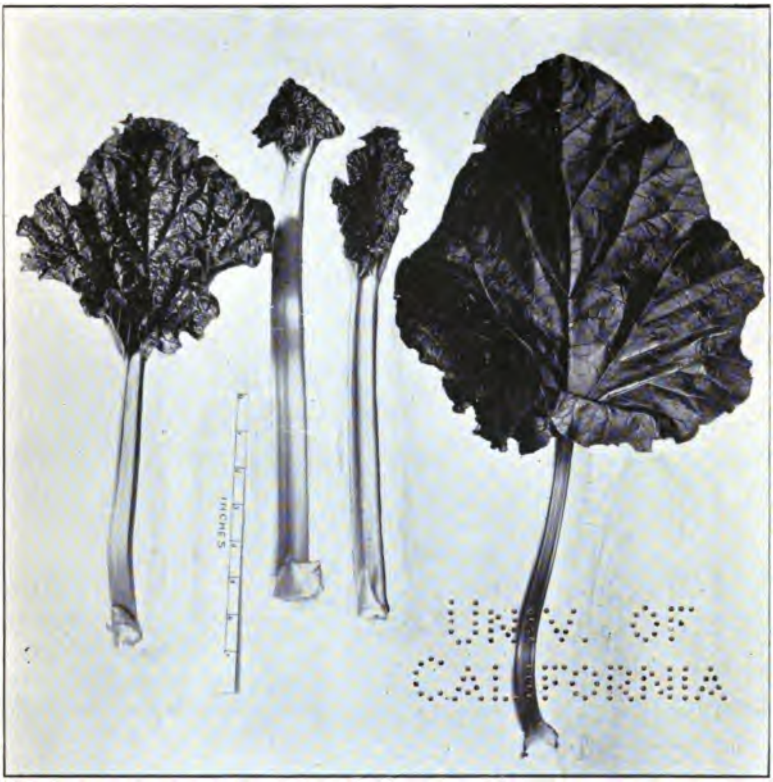

UNIV. OF CALIFORNIA

RHUBARB.

The middle stalks are dark grown. The others are forced in sunlight. Note the difference in the thickness of the stems.

### CULTURE.

The roots should be dug during rather mild winter weather when the soil will not be hard to work. For the small grower the spade will answer for the work, but where the enterprise is entered upon in a larger way it is better to plow the roots out. Run a mark down along the row, then turn a furrow away from row close to roots and cut off superfluous prongs. Next run along the other side of the row, turning the roots over and cutting off all extra prongs from that side. The roots should now be laid out upon the surface of the ground and trimed up neatly with spade or shovel, but leaving as much soil adhering to them as possible. Allow the roots to become well frozen before removing to cellar or pit where they are to be grown. This freezing seems to be requisite to the greatest success of the industry. The roots must have their full share of winter. There is an advantage in freezing the roots, too, for they are much more easily handled when in a solid chunk and are easier to set and get well packed into the soil.

### SETTING.

In setting the roots be careful to get them well surrounded with soil. This is where the advantage from trimming off extra prongs comes in. It is a hard matter to get the earth well packed about and against the roots if they are so irregular.

Set the roots as close together as possible, leaving a passageway every three or four feet. The impulse is to set the roots about a foot apart each way, but it will be found that there is much space wasted in this way. After getting the roots well set give the bed a good ducking and turn on the heat. In a few days small fibrous roots will be thrown out and the crowns will begin to expand. Then the first leaves will open and up will shoot three or four of the prettiest rhubarb stocks you ever saw.

The proper temperature seems to be from 60° to 75° F. At this temperature we raise such stocks as you see before you, in twenty days from time of setting in cellar. Cutting can then be continued for from four to six weeks.

It is a good plan to do a little prunning in rhubarb culture as well as in all pursuits of this kind. The small, spindling stocks should be pulled off as they appear so that the strength of the plant may go into the larger stocks.

Concerning the profits of the enterprise I would say that the dark-grown product sells for seventy-five cents a dozen bunches in the Columbus market, there being from three to six stocks in a bunch. From a space eight by ten feet in a place which could be used for nothing else we sold some ten dollars' worth of rhubarb.

Concerning the staying qualities of this enterprise I would say that it fills a gap for Northern gardeners and farmers that before this was profitless, and from the small amount of labor and experience necessary to success it may well be supposed that forcing rhubarb in the dark has come to stay.

Concerning the practicability of the plan you may say that all gardeners do not have the pipe-heated cellar in which to force their rhubarb. For such as these, and in fact for all of us, let me describe a cheap and I believe practical way in which to manage the crop: Construct a manure-heated hot-bed in the usual way by placing a frame upon a well packed bed of fresh horse manure. This frame may be of any convenient dimensions, but may be simpler than the ordinary frame, in that it need have no slope. The sash rest of the ordinary frame is inclined so that the crops may get the advantage of a more intense sunlight; but in this case we need pay no attention to the light, except to keep it out. Thus construct a frame about twenty four inches in depth and the same height all around. Set this frame upon the manure bed, and set the roots upon the manure, in soil six to eight inches deep. Water well and cover the frame tightly with plank, and upon the plank put a layer of good manure. Thus you will have a hot-bed that is warm and dark, and the distance of the plank from the crowns of the roots will allow a stock growth of sixteen to eighteen inches to be made. As a working rule it should be remembered that each will occupy about one square foot of surface.

A writer in *Rural New Yorker*, of January 21st, 1899, says:

"December 21, I visited the grounds of N. Michels, one of the pioneer growers of this section (Detroit), and the first, I think, to adopt the dark-growing method. He has his house cellar and two large forcing cellars filled; but as yet uses no heat. A row of ten hot-beds was being filled, which will be held in check until the last of February, when the manure will be applied, and forcing will begin. Besides this, he had twelve boxes covered in one unbroken mound, six of which were for immediate use, and six to follow in succession. I walked over the mound, and there beneath my feet, shut away from the light and air, and forced entirely by the heat of the manure, the rhubarb was growing and ready for the market. December 20, from three of these boxes, six by fourteen feet in size, he picked thirty-one dozen, which brought in the wholesale house, seventy-five cents per dozen, or $23.25 for one picking. These boxes were of the Linnæus variety, and will give two more pickings; the next picking is expected to be best of all.

"While the ordinary and safe plan is to freeze the roots before forcing, these roots were started without freezing. Placed in the boxes in November, with no watering or other care, in forty-five days he is getting a return of $23.25 for 252 square feet of ground, with two pickings yet to hear from. Mr. Michels is a gardener of over forty years' experience, and says that this is the best paying crop he can raise, for the reason that the greater part of the labor is done after the other crops are secured, and the sales come at a time when so little else can be grown except by the expensive methods of glass forcing."

In cellar forcing the heating may be done from furnace; or a coal or oil stove may be used.

## REPORT OF THE COMMITTEE ON ENTOMOLOGY FOR MARCH.

BY JAMES S. HINE.

A number of wood-boring larvæ infest hickory wood. Two are especially injurious to this wood a year or so after it is taken from the green tree. *Chion cinctus* and *Cylene pictus* seem to be about equally common in this locality. Cord wood often shows an injury which I have estimated to amount to at least one-tenth of its weight.

The remedies offered are as follows: Cord wood should be used the first year, and timber for manufacturing purposes may be dried in sheds, the open parts of which are covered with wire screen. It is known that less injury results when the timber is cut in the fall, also if the bark is taken off at once after cutting.

The hackberry tree seems to have more than its share of injurious pests. The bird's nest fungus makes the trees very striking, and in some cases, at least, unsightly; but aside from this, they harbor many gall insects. Two of these galls observed here are made by different species of the genus—*Pachypsylla, P. c. mamma* and *P. c. gemma.* The former of these species produce maumiform galls on the leaves. These galls are very conspicuous in the fall just before the leaves fall. The latter species causes bud-like swellings on the twigs. These remain attached all winter and may be seen at the present time, the larvæ in place within the swelling, at various places in this vicinity.

Injury to carnations has been reported from the botanical greenhouse by Mr. Luke. Upon investigation I find nothing that I can attribute the injury to except the larvæ of one of the fungus gnats, *Sciara inconstans*, Fitch. Although the larvæ of this family are usually considered as developing in decaying plants and the like, Mr. Coquillett has described a species whose larva is injurious to growing wheat in greenhouses. The one I have reared from the stems of carnations is a different species but of the same genus, and I find its work similar to *S. tritici*, Coq. in wheat.

## * SOURCES OF THE OHIO FLORA.

BY A. D. SELBY AND J. W. T. DUVEL.

In this discussion, it is the aim of the authors to present a very brief survey of the Ohio Flora, viewed by the light of the direction of origin, after first considering its present elements. In this respect, the method of study pursued is analogous to that of Coulter and Thompson in their "Origin of the Indiana Flora."

Broadly speaking, the State of Ohio is divided into a south-southeastern, hilly or mountain region, comprising about one-third the total area, partially covered by drift at the southwest, and a north-northwestern glaciated area, which is more level though often rolling. The first named has an Appalachian character of plants, both as to probable origin and as to ecological composition. The topography is rugged in most parts, and while there are various soils, accordingly as derived from different underlying strata, it does not seem clear that a division of the region can be easily made, at present; a subdivision may finally be found along the sub-carboniferous outcrop, through Ross, Pike and Scioto counties.

The glaciated or drift area of the state, from the general aspect of which we find marked topographical deviations in several parts, certainly admits of division, though first attempts are necessarily more or less tentative. We have made an effort to bring out regions showing a characteristic flora. At the north, excluding the lake beaches, etc., the separation appears to follow the out-crop of the Huron shale, and this holds true southward to Fairfield County. The western portion of the State appears to have a more uniform flora from north to south, than is found in the eastern.

### THE PLANT REGIONS OF OHIO.

The division of any state into regions which are characterized by certain peculiar or typical species of plants is by no means an easy task. Such regions if properly and correctly drawn must conform to the boundaries of the spheres of operation of the causes leading to the final results we now discover in Ohio. Brevity is imposed upon all the discussions of this paper; what is stated, therefore, must be without any considerable illustration. We have endeavored to study the Ohio

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* **Read in part before the Ohio State Academy of Science, December, 1898.**

Flora as it is, and have been influenced in the work by what appear to have been the general conditions of plant distribution on our continent. If the method of study be correct, then any errors in the detailed lists will certainly be corrected. Such errors and especially omissions will doubtless present themselves to many.

The discussion of the geology and topography of Ohio is largely excluded, and we may only refer to some very general features.* The western half, exclusive of a limited area in the extreme northwest, is underlaid by various limestone formations with accompanying shales from the Lower Silurian to the Devonian in age; bordering this on the northwest and extending on the east almost through the state, are the shale deposits of Devonian age; on these in turn are superposed the subcarboniferous and the coal bearing strata; the latter characterize much of eastern Ohio. The Ohio river and its tributaries drain the larger part of the area, while the minor drainage is by the Maumee and various smaller streams into Lake Erie. The areas of former glacial activity have already been indicated.

Out of all the past changes within our boundary comes the Ohio of botanical study, and we shall expect to perceive marks of past conditions upon every side. The state may apparently be divided into the four plant regions which follow. Geological and climatic conditions appear for the most part to have been potent factors; topography is certainly not wanting in influence. No part of our area is deficient in rainfall; many situations exhibit plants adapted to periods of dryness.

### 1. *The Region of Hills—Neo-Appalachian.*

This region includes the unglaciated south-southeastern portion of the state as well as the glaciated hills along the Ohio river in the southwest. The entire region is much broken and broadly speaking is the Ohio Valley Hill Region, limited at the northeast by the glacial advance.

### 2. *The Northeastern Highland Region—Neo-Transition.*

The region thus named is glaciated, often dotted by small lakes, and has, for its almost median line, the Lake Erie watershed. It extends westward to the Huron river and follows the Huron shale southward till this is approached by the glacial moraine in northern Fairfield County; thence to Pennsylvania the line of separation follows near the moraine, north and slightly east to northeast Knox County and then in a north-bending curve to the state line. Extreme northwestern Ohio may also fall in this region.

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*The reader who would pursue the matter further is referred to the Reports of the Ohio Geological Survey, especially to Vol. VII, 1893, which contains a small geological map of Ohio.

### 3. *The Lake Erie Region—The Lacustrine.*

This region includes the present inlets, marshes, and beaches of Lake Erie, also the ancient beaches or deep sands of the Oak-openings now some distance from the lake. Such sands are found in Fulton, Lucas and Henry; they are continued across Ohio in Sandusky, Erie, Lake and other counties.

### 4. *The Western Region—The Calcareous.*

The western region includes almost half the state, all glaciated, extending from Erie, Crawford, Morrow, Delaware, Franklin and Pickaway counties westward to Indiana and southward to Highland and Hamilton. The prairie plants are chiefly limited to this western region. There follow short lists of the indigenous plants of these regions :

### *Typical Species of the Neo-Appalachian Region.*

Pinus Virginiana,
Pinus rigida,
Uniola latifolia,
Panicularia nervata,
Habenaria peramœna,
Corallorhiza Corallorhiza,
Betula nigra,
Betula lenta,
Castanea pumila,
Quercus nigra,
Phoradendron flavescens,
Silene rotundifolia,
Alsine pubera,
Trollius laxus,
Liquidambar Styraciflua,
Porteranthus stipulatus,
Stylosanthes biflora,
Acalypha ostryæfolia,
Ilex opaca,
Tilia heterophylla,
Ascyrum hypericoides,
Aralia spinosa,
Azalea lutea,
Rhododendron maximum,
Kalmia latifolia,
Oxydendrum arboreum,
Chionanthus Virginica,
Gentiana villosa,
Ampelanus albidus,
Vincetoxicum gonocarpos,
Trichostema dichotomum,
Dasystoma lævigata,
Bignonia crucigera,
Triosteum angustifolium,
Lobelia puberula,
Chrysopsis Mariana,
Coreopsis major,
Coreopsis auriculata.

Northern and southern forms are here mingled. Many of the typical plants of this region are included in the list of plants from the south and southeast, while not a few have a northeastern range.

## *Typical Species of the Neo-Transition Region.*

Pinus Strobus,
Larix laricina,
Potamogeton amplifolius,
Potamogeton lonchites,
Potamogeton perfoliatus,
Potamogeton foliosus,
Potamogeton obtusifolius,
Oryzopsis juncea,
Cinna latifolia,
Scirpus subterminalis,
Scirpus debilis,
Scirpus Torreyi,
Eriophorum vaginatum,
Eriophorum polystachyon,
Eriophorum gracile,
Carex oligosperma,
Carex scabrata,
Carex limosa,
Carex pallescens,
Carex conoidea,
Carex pedunculata,
Carex tenella,
Carex sterilis,
Carex canescens,
Carex trisperma,
Calla palustris,
Vagnera trifolia,
Habenaria Hookeriana,
Habenaria blephariglottis,
Corylus rostrata,
Betula lutea,
Blitum capitatum,
Sagina procumbens,
Nymphæa Kalmiana,
Coptis trifolia,
Aconitum Noveboracense,
Aconitum uncinatum,
Adlumia fungosa,
Sarracenia purpurea,
Geum strictum,
Sorbus sambucifolia,
Polygala paucifolia,
Ilicioides mucronata,
Hypericum ellipticum,
Conioselinum Chinense,
Hydrocotyle Americana,
Cornus Canadensis.
Pyrola asarifolia,
Pyrola secunda,
Oxycoccus Oxycoccus,
Viburnum alnifolium,
Viburnum cassinoides.

The plants of this region given above as typical, are north and northeastern in range. *Pinus strobus* and *Larix laricina* are here indigenous, while numerous species of high latitudes are found in the deep ravines and about the small lakes and tamarack swamps peculiar to this part of our glaciated area. The typical species and the general aspects of the region resemble quite closely those of northeastern Indiana. Extreme northwestern Ohio will doubtless disclose there, upon thorough investigation, many of the plants in this list.

## *Typical Species of the Lacustrine Region.*

Equisetum littorale,
Juniperus communis,
Potamogeton prælongus,
Potamogeton Hillii,
Potamogeton Friesii,
Potamogeton interruptus,
Sporobolus cryptandrus,
Ammophila arenaria,
Calamovilfa longifolia,
Sieglingia purpurea,
Eragrostis pectinacea,
Cyperus Schweinitzii,
Juncus Gerardi,
Salix amygdaloides,
Salix glaucophylla,
Polygonum ramosissimum,
Polygonella articulata,
Anemone cylindrica,
Ranunculus ovalis,
Cakile edentula,
Potentilla arguta,
Potentilla paradoxa,
Potentilla Anserina,
Prunus cuneata,
Lathyrus maritimus,
Lathyrus ochroleucus,

Geranium Robertianum,
Polygala cruciata,
Polygala polygama,
Euphorbia polygonifolia,
Viola lanceolata,
Proserpinaca palustris,
Arctostaphylos Uva-Ursi,
Lithospermum hirtum,
Melampyrum lineare,
Lonicera oblongifolia,
Artemisia Canadensis.

The marine species of our flora are found on the lake shores and beach sands. Many of the typical species are found throughout the great lakes. Many boreal plants grow in this region.

### *Typical Species of the Calcareous Region.*

Thuja occidentalis,
Triglochin palustris,
Sporobolus heterolepis,
Eatonia obtusata,
Kœleria cristata,
Bromus Kalmii,
Cladium mariscoides,
Carex siccata,
Trillium nivale,
Erysimum asperum,
Potentilla fruticosa,
Kraunhia frutescens;
Meibomia Illinoensis,
Ceanothus ovatus,
Dodecatheon Meadia,
Verbena bracteosa,
Clinopodium glabrum,
Lactuca pulchella,
Solidago Ohioensis,
Aster azureus,
Leptilon divaricatum.

The greater number of the typical species for the western region are southwestern and western in range. The eastward limitation of a large number of species is noted by Moseley in his Sandusky Flora now in press. It must appear to all that this is the least satisfactory of the typical lists.

## WHENCE CAME THE PLANTS OF OHIO?

Taking the Ohio Flora as a whole, we may properly consider it in the light of its sources, or origin, as indicated by the range of its species.

The identity of many genera and species of the North American Flora, with those of Europe and Eastern Asia was long the subject of careful investigation by Dr. Asa Gray (I, II, III, IV). A study of his work must not be omitted if we would become familiar with the elements of our Flora, considered in this relation. He has shown (II and IV) that in the number of identical genera and species of forest trees the Flora of the Atlantic United States approaches more nearly to that of Eastern Asia than to the Pacific Slope. After discussing the striking differences in the present forests of Europe and Western America on the one hand, compared with those of the Atlantic United States and Eastern Asia on the other, he continues as follows (IV, 188): "Extending the comparison to shrubs and herbs it more than appears that the forms and types which we count as peculiar to our Atlantic region, when we compare them as we first naturally do, with Europe and our west, have their close counterparts in Japan and North China; some in identical species (especially among herbs) often in strikingly similar ones, not rarely as sole species of peculiar genera or related generic types. Evidences of this remarkable relationship have multiplied year after year, until what was long a wonder has come to be so common that I should now not be greatly surprised if a Sarracenia or a Dionœa, or their like, should turn up in Eastern Asia. Very few of such isolated types remain without counterparts. It is, as if Nature when she had enough species of a genus to go around, dealt them fairly, one at least to each quarter of our zone; but when she had only two of some peculiar kind, gave one to us and the other to Japan, Manchuria or the Himalayas; when she had only one, divided this between the two partners on the opposite sides of the table."

As a more complete illustration of this relationship we give the following table extracted from the appendix of Dr. Gray's Dubuque address (IV) and from his paper On the Botany of Japan. It is supplemented by a list of species occurring in Ohio, Asia and Japan and also found in Europe.

### LIST OF EXTRA-EUROPEAN PLANTS OCCURRING IN OHIO AND IN NORTHEASTERN ASIA, REPRESENTED BY IDENTICAL OR STRICTLY REPRESENTATIVE SPECIES.

| 1. *In Ohio.* | 2. *In Northeastern Asia—Japan to Altai Mountains.* |
|---|---|
| Lycopodium lucidulum, | Lycopodium lucidulum, |
| Lycopodium dendroideum (L. obscurum L.), | Lycopodium dendroideum, |
| Adiantum pedatum, | Adiantum pedatum, |
| Asplenium acrostichoides, | Asplenium acrostichoides, |
| Camptosorus rhizophyllus, | Camptosorus Sibiricus, |
| Onoclea sensibilis, | Onoclea sensibilis, |
| Osmunda cinnamomea, | Osmunda cinnamomea, |
| Osmunda Claytoniana, | Osmunda Claytoniana, |
| Botrychium Virginicum, | Botrychium Virginicum, |
| Thuja occidentalis, | Thuja Japonica, |
| Tsuga Canadensis, | Tsuga Tsuga, etc., |
| Pinus Strobus, | Pinus excelsa, |
| Taxus minor, | Taxus cuspidata, |
| Avena striata, | Avena callosa, |
| Zizania aquatica, | Zizania=Hydrophyrum latifolium, |
| Carex stipata, | Carex stipata, |
| Eriophorum cyperinum, | Eriophorum cyperinum, |
| Abama Americana, | Abama Asiatica, |
| Erythronium Americanum and Albidum, | Erythronium grandiflorum, |

| | |
|---|---|
| Vagnera (*Smilacina*) trifolia, | Vagnera (*Smilacina*) trifolia, |
| Vagnera (*Smilacina*) racemosa, | Vagnera (*Smilacina*) Japonica, |
| Vagnera (*Smilacina*) stellata, | Vagnera (*Smilacina*) Davarica, |
| Polygonatum commutatum, | Polygonatum commutatum, |
| Clintonia borealis, | Clintonia udensis, |
| Disporum (*Prosartes*) lanuginosum, | Disporum (*Prosartes*) lanuginosum, |
| Chamælirium luteum, | Chamælirium luteum, |
| Trillium grandiflorum, | Trillium obovatum, |
| Trillium erectum, | Trillium erectum var, |
| Smilax hispida, | Smilax Lieboldii, |
| Smilax herbacea, | Smilax herbacea=Nipponica, |
| Iris cristata, | Iris tectorum=cristata, |
| Aletris farinosa, | Aletris Japonica, |
| Habenaria flava, | Habenaria fucescens, |
| Leptorchis (*Liparis*) liliifolia, | Leptorchis (*Liparis*) liliifolia, |
| Pogonia ophioglossoides, | Pogonia ophioglossoides, |
| Symplocarpus fœtidus (*Spathyema Raf*), | Symplocarpus fœtidus and Lysichiton Camschatcense, |
| *Arisaema* 3 spp., | *Arisaema* 9 spp., |
| Corylus rostrata, | Corylus rostrata var Mandechuriana, |
| Juglans cinerea, | Juglans Mandechuriana, stenocarpa, |
| Urticastrum (*Laportea*) divaricatum, | Urticastrum (*Laportea*) evitata, |
| Adicea (*Pilea*) pumila, | Adicea (*Pilea*) pumila, |
| Saururus cernuus, | Saururus Loureiri, |
| Lindera Benzoin, | Lindera hypoglauca, |
| Polygonum arifolium, | Polygonum perfoliatum, |
| Polygonum sagittatum, | Polygonum sagittatum, Lieboldii, |
| Phylotacca decandra, | Phylotacca Kumpferi, |
| Asarum Canadensis. | Asarum caulescens and Lieboldii. |
| Brasenia purpurea, | Brasenia purpurea, |
| Nelumbo (*Nelumbium*) luteum, | Nelumbo (Nelumbium) speciosum, |
| Magnolia acuminata, | *Magnolia*, 8 to 12 spp., |
| Anemone Pennsylvanica, | Anemone dichotoma=Pennsylvanica, |
| Oxygraphis Cymbalaria, | Oxygraphis (*Ranunculus*) Cymbalaria |
| Ranunculus Pennsylvanicus, | Ranunculus Pennsylvanicus, |
| Trautvetteria Carolinensis, | Trautvetteria Carolinensis, |
| Hydrastis Canadensis, | Hydrastis Jesoensis, |
| Aconitum uncinatum, | Aconitum uncinatum, |
| Actæa rubra, | Actæa rubra, |
| Actæa alba, | Actæa alba, |
| Cimicifuga racemosa, | (*Cimicifuga*, 3 spp.), |
| Menispermum Canadense, | Menispernum Dahariane, |
| Arabis lyrata, | Arabis lyrata, |
| Caulophyllum thalictroides, | Caulophyllum thalictroides, |
| Jeffersonia diphylla, | Jeffersonia=Plagiorhegnea dubium, |
| Capnoides aureum, | Capnoides (*Corydalis*) aureum, |
| Ribes Cynosbati, | Ribes Cynosbati, |
| Ribes lacustre, | Ribes lacustre, |
| Ribes prostratum, | Ribes laxiflorum, |
| Tiarella cordifolia, | Tiarella polyphylla, |
| Sorbus (*Pyrus*) sambucifolia, | Sorbus (*Pyrus*) sambucifolia, |
| Rubus Americanus, | Rubus Americanus var Japonicus, |
| Rubus strigosus, | Rubus strigosus, |

| | |
|---|---|
| Amelanchier Canadensis var, | Amelanchier Canadensis var, |
| Gleditschia triacanthos, | Gleditschia Chinensis, etc., |
| Æsculus glabra, | Æsculus Chinensis and Hippocastanum, |
| Acer spicatum, | Acer spicatum var, |
| Acer Pennsylvanicum, | Acer legmentosum, |
| Rhus Vernix, | Rhus Vernix ? (vernicifera) |
| Rhus radicans, | Rhus radicans, |
| Vitis Labrusca, | Vitis Labrusca, |
| Ampelopsis cordata, | Vitis humifolia, |
| Triadenum (*Hypericum*) petiolatum | Triadenum (*Hypericum*) petiolatum, |
| Triadenum (*Hypericum*) Virginicum | Triadenum (*Hypericum*) Virginicum, |
| Viola Canadensis, | Viola Canadensis var., |
| Cornus Canadensis, | Cornus Canadensis, |
| Cornus florida, | *Benthamia*, spp., |
| Cornus stolonifera, | Benthamia alba, |
| Aralia spinosa, | Aralia spinosa var., |
| Aralia racemosa, | Aralia edulis, etc., |
| Panax quinquefolium, | Aralia (*Panax*) Ginseng, etc., |
| Heracleum lanatum, | Heracleum lanatum, |
| Sium cicutæfolium, | Sium cicutæfolium, |
| Deringa (*Cryptotænia*) Canadensis, | Deringa (*Cryptotænia*) Canadensis, |
| Washingtonia (*Osmorrhiza*) longistylis, | Washingtonia (*Osmorrhiza*) longistylis, |
| Pyrola elliptica. | Pyrola elliptica. |
| Gaultheria procumbens, | Gaultheria pyroloides, |
| Epigæa repens, | Epigæa Asiatica, |
| Chiogenes hispidula, | Chiogenes hispidula, |
| Monotropa uniflora, | Monotropa uniflora, |
| Menyanthes trifoliata, | Menyanthes trifoliata, |
| Lithospermum officinale, | Lithospermum officinale, |
| Teucrium Canadense, | Teucrium Japonicum, |
| Phlox subulata, | Phlox Sibirica, |
| Veronica Virginica, | Veronica Virginica, |
| Tecoma radicans, | Tecoma grandiflora, |
| Lycopus Virginicus, | Lycopus parviflorus, |
| Phryma Leptostachya, | Phyrma Leptostachya, |
| Mitchella repens, | Mitchella undulata, |
| Viburnum lantanoides, | Viburnum lantanoides, |
| Artemisia Canadensis, | Artemisia Canadensis=commutata, |
| Artemisia biennis. | Artemisia biennis. |

## SPECIES COMMON TO OHIO, EUROPE AND NORTHEASTERN ASIA.

| *In Ohio.* | *In Europe and Northeastern Asia.* |
|---|---|
| Ophioglossum vulgatum, | Ophioglossum vulgatum, |
| Osmunda regalis, | Osmunda regalis, |
| Dryopteris (*Lashea*) dilatata, | Dryopteris (*Lashea*) dilatata, |
| Polypodium vulgare, | Polypodium vulgare, |

| | |
|---|---|
| Juniperus communis. | Juniperus communis, |
| Alopecurus geniculatus, | Alopecurus geniculatus, |
| Phalaris arundinacea, | Phalaris arundinacea, |
| Poa pratensis, | Poa pratensis, |
| Poa serotina, | Poa serotina, |
| Milium effusum, | Milium effusum, |
| Savastana odorata, | Savastana odorata, |
| Panicularia (*Glyceria*) fluitans, | Panicularia (*Glyceria*) fluitans, |
| Carex filiformis, | Carex filiformis, |
| Eriophorum gracile, | Eriophorum gracile, |
| Scirpus lacustris, | Scirpus lacustris, |
| Juncus effusus, | Juncus effusus, |
| Streptopus amplexifolium, | Streptopus amplexifolium, |
| Fagus Americana, | Fagus sylvatica, |
| Alsine uliginosa, | Alsine uliginosa, |
| Caltha palustris, | Caltha palustris, |
| Coptis trifolia, | Coptis trifolia, |
| Hepatica Hepatica and acuta, | Hepatica Hepatica, |
| Ranunculus sceleratus, | Ranunculus sceleratus, |
| Arabis hirsuta, | Arabis hirsuta, |
| Roripa palustris, | Roripa palustris, |
| Drosera rotundifolia, | Drosera rotundifolia, |
| Agrimonia mollis (A. Eupatoria), | Agrimonia mollis, |
| Geum strictum, | Geum strictum, |
| Comarum (*Potentilla*) palustris, | Comarum (*Potentilla*) palustris, |
| Potentilla Anserina, | Potentilla Anserina, |
| Spiræa salicifolia, | Spiræa salicifolia, |
| Aruncus Aruncus, | Aruncus Aruncus, |
| Lathyrus palustris, | Lathyrus palustris, |
| Hamamelis Virginica, | Hamamelis Japonica (Asia), |
| Chrysosplenium Americanum, | Chrysosplenium Americanum, |
| Circæa alpina, | Circæa alpina, |
| Cornus Amonum (C. sericea), | Cornus sanguinea, |
| Pyrola rotundifolia, | Pyrola rotundifolia, |
| Moneses uniflora, | Moneses uniflora, |
| Oxycoccus Oxycoccus, | Oxycoccus Oxycoccus, |
| Menyanthes trifoliata, | Menyanthes trifoliata, |
| Polemonium reptans, | Polemonium cœruleum, |
| Myosotis arvensis, | Myosotis arvensis, |
| Stachys palustris, | Stachys palustris, |
| Stachys aspera, | Stachys aspera, |
| Utricularia intermedia, | Utricularia intermedia, |
| Veronica Anagallis-aquatica, | Veronica Anagallis-aquatica, |
| Viburnum Opulus, | Viburnum Opulus, |
| Sambucus pubens, | Sambucus pubens, |
| Galium triflorum, | Galium triflorum, |
| Synosma (*Cacalia*) suaveolens. | Synosma (*Cacalia*) suaveolens. |

This tabulation shows that 112 indigenous species of Ohio plants are represented in Japan and Northeast Asia by identical or allied species, while 51 are thus represented in both Northeast Asia and Europe. Had we at command a late enumeration of the Asiatic plants it is possible that these figures would require revision.

The relation of the Flora of the Northeastern United States to that of Europe is very marked; Ohio as a member of this region, which has gradually come to be called the "Manual Range" (latterly extended west to the 100th meridian) partakes likewise of this similarity in its Flora.

There are, (Gray I), of indigenous plants, 180 species of dicotyls, 141 species of monocotyls and 20 species of ferns common to the Northeastern United States and Europe or 341 species in all three classes of plants; of these 150 species of phanerogams and 16 species of ferns and allies are found in Ohio.

According to views held generally by naturalists these relationships between the Flora of Eastern North America, including Ohio, and those of Europe and Asia as already pointed out, indicate that in the past histories of the floras of these regions, there has been a common source from which the plants of the several countries have arisen. Allowing for the relation between allied forms and like topographical, geological and climatic conditions there yet remains the disposition everywhere shown by naturalists, to refer identity of form to similarity of origin. By this is meant not only to similar conditions under which alone these resemblances would be maintained if once possessed, but to refer the plants to identical progenitors. Or to state it in another way, it is held that the effect of environment is to modify pre-existing forms, not to create new ones outright. When, therefore, similarity or identity of species is found, as in the case cited, like conditions of growth alone will not explain their occurrence. Community of origin is likewise called for.

For us in the present instance, this means that at one time the progenitors of the plants of Japan, North China, and the progenitors of the plants of Ohio, or a large number of them, grew together in the North Polar region, whence they were forced southward by the gradual change of climate which was here during the glacial epoch. The studies of palæontologists have shown similar fossil plants in deposits within the Artic Circle, and there is abundant evidence of the former existence of a flora like our present one in these high latitudes. Assuming that such plants were driven to new conditions they would be modified by ecological adaptations. Furthermore, plants from the north have met those typical of more southerly situations; the former have receded with returning warmth and have carried the latter with them. Our flora appears clearly to have been the meeting point of plants from the northeast and from the northwest. These have been met in turn by plants from the east, often originally from the northeast, from the south and from the west—the latter the more recent of our accessions. In the lists which are to follow the various components will appear.

It may be said that the topography exerts a great influence. All appreciate this; at the same time must we not consider the effects of pre-glacial and interglacial drainage when we would write a full history of the Ohio plants? As the glacial advance must have forced plants south of us, which upon the glacial recession again returned, so likewise must there have been carried forward the plants which grew beside our President's great, pre-glacial, north-flowing river of this region; some of them in turn come back to us as plants from the south. Liquidambar and Phoradendron spring into mind at once. They also represent two different means by which the migration of land plants are effected. The Ohio plants, like the people who followed them, by reason of the eastern gateway which the settlers found to the vast Valley of the Mississippi, are cosmopolitan in character. Ecology and Ethnology alike make record of these blended races.

Some few words of explanation will probably be necessary in order that the classification as to direction of migration of plants may be fully understood. In making up these lists it has been our aim to take only those plants concerning which there can be little doubt as to the direction of their movement; yet, we may have included some that might well have been omitted and conversely. We have also indicated those which occur in Europe, etc. Introduced or naturalized plants are collected in a separate list; the number of these may doubtless be as much of a surprise to others as it was to us.

Topographical and hydrographical features have been considered in making the lists. Thus, for example, we may have plants extending from Nova Scotia to Michigan and south in the mountains to Georgia or Alabama, yet these plants appear to have come to us from the northeast, as their southern limits are confined to the mountain districts. Again, we may have plants ranging from Texas to Florida and along the coast to New Jersey, or probably even to Massachusetts. Where such plants have made their way into our state we naturally conclude that they are southern, having made their advance along the river valleys and not across the mountains.

As for plants from the east and southeast we have taken only those of a limited area; those of a more extended range being classed with the plants from the northeast and south respectively.

In making up the lists of plants that have come in from the north, we met with many difficulties, owing to the fact that such a vast number of our northern plants have a wide range, some even from the Atlantic to the Pacific, thus making it impossible, in many cases, to determine whether they were strictly northern or whether they should be listed as having come from the northeast or northwest. The list of northern plants, therefore, has probably been unduly increased at the expense of those from the northeast and northwest, for in the majority of cases they undoubtedly have moved in one or the other of these directions at the time of two great glacial advances along these lines. We also believe them to be northeastern or northwestern in so much as many of them are to be found in Europe or Asia. However, in either case, they will be designated throughout the lists, so that the reader may readily distinguish them.

The order in which the plants are arranged and the nomenclature used is that given by Britton and Brown in their Illustrated Flora of the Northern States and Canada. Ranges have been obtained from available sources. The Catalogue of Ohio Plants by Kellerman and Werner has been the usual source of information concerning distribution in the state. Other sources are indicated in the list of works.

Plants found also in Europe are marked with an asterisk *; plants having a northern range from the Atlantic to the Pacific are marked with a dagger †.

### *Plants from the Northwest.*

Potamogeton amplifolius,
Potamogeton obtusifolius,
Stipa spartea,
Sporobolus heterolepis,
Agrostis exarata,
Cyperus Schweinitzii,
Carex aristata,
Carex durifolia,
Carex teretiuscula prairea,
Carex Muskingumensis,
Allium cernuum,
Asarum acuminatum,
Polygonum amphibium,
Polygonum Hartwrightii,
Atriplex argentea,
*Alsine longifolia,
Arabis dentata,
Erysimum inconspicuum,
Chrysosplenium alternifolium,
†Ribes lacustre,
Hydrophyllum Virginicum,
Steironema quadriflorum,
Lonicera glaucescens,
Valeriana edulis,
Lactuca pulchella,
Helianthus lætiflorus,
Artemisia biennis.

### *Plants from the North.*

†*Ophioglossum vulgatum,
†*Botrychium lanceolatum,
†*Onoclea Struthiopteris,
†*Woodsia glabella,
†*Dryopteris spinulosa,
†*Dryopteris spinulosa intermedia,
†*Dryopteris spinulosa dilatata,
†Phegopteris Dryopteris,
†*Equisetum arvense,
†*Equisetum sylvaticum,
†*Equisetum fluviatile,
*Equisetum variegatum,

†Equisetum scirpoides,
†Lycopodium obscurum,
†*Lycopodium annotinum,
†*Lycopodium clavatum,
†*Lycopodium complanatum,
†*Juniperus communis,
Taxus minor,
†Sparganum eurycarpum,
†Potamogeton Robbinsii,
†*Triglochin palustris,
†Oryzopsis asperifolia,
†*Cinna latifolia,
†Avena striata,
†*Phalaris arundinacea,
*Poa flava,
†*Panicularia fluitans,
†Scirpus subterminalis,
†*Eriophorum vaginatum,
Rynchospora capillacea,
Carex utriculata,
†Carex filiformis,
†*Carex aquatilis,
†*Carex limosa,
†Carex viridula,
Carex digitalis copulata,
Carex aurea,
†*Carex teretiuscula,
†*Carex tenella,
†*Carex canescens,
*Carex tenuiflora,
Carex fœnea,
†*Juncus filiformis,
†*Juncus Balticus,
†*Juncus articulatus,
†Juncus Richardsonianus,
†*Juncoides pilosum,
†Tofieldia glutinosa,
†Zygadenus elegans,
Vagnera trifolia,
Orchis rotundifolia,
Habenaria orbiculata,
Corallorhiza Corallorhiza,
Populus balsamifera,
Populus tremuloides,
Salix candida,
*Blitum capitatum,
*Alsine longipes,
Castalia tuberosa,
Cardamine purpurea,
Arabis brachycarpa,
†Ribes oxyacanthoides,
Phaca neglecta,
†Vicia Cracca,
†Vicia Americana,
†*Lathyrus palustris,
*Hypericum Ascyron,
†Pyrola asarifolia,
†Moneses uniflora,
†Andromeda Polifolia,
†Menyanthes trifoliata,
Galium lanceolatum,
†Mentha Canadensis,
†*Veronica Anagallis-aquatica,
Gerardia paupercula,
†Viburnum Opulus,
†Lonicera cœrulea,
*Campanula rotundifolia,
Aster longifolius.

## *Plants from the Northeast.*

*Botrychium matricariæfolium,
Woodsia Ilvensis,
Dryopteris cristata Clintoniana,
Dryopteris Goldieana,
Asplenium acrostichoides,
Pinus Strobus,
Larix laricina,
Tsuga Canadensis,
Thuja occidentalis,
Potamogeton Vaseyi,
Panicum xanthophysum,
*Milium effusum,
*Ammophila arenaria,
*Deschampsia flexuosa,
Poa debilis,
Poa alsodes,
Panicularia obtusa,
Panicularia elongata,
Panicularia pallida,
Panicularia acutiflora,
Cyperus dentatus,
Eleocharis interstincta,
Eleocharis olivacea,
*Scirpus sylvaticus,
Scirpus cyperinus,
Eriophorum Virginicum album,
*Rynchospora fusca,
Carex oligosperma,
Carex Tuckermani,
Carex Pseudo-Cyperus,
Carex Goodenovii,
Carex prasina,
Carex costellata,
Carex formosa,
Carex arctata,
Carex tenuis,
*Carex pallescens,
Carex flava,

Carex conoidea,
Carex Careyana,
Carex setifolia,
Carex pedunculata,
Carex pedicellata,
Carex pelicellata Wheeleri,
Carex Novæ-Angliæ,
Carex chordorhiza,
Carex rosea radiata,
Carex interior capillacea,
Carex straminea,
Carex straminea mirabilis,
Allium tricoccum,
Lilium Philadelphicum,
Lilium tigrinum,
Trillium erectum,
Cypripedium acaule,
Cypripedium reginæ,
Habenaria blephariglottis,
Habenaria grandiflora,
Habenaria psycodes,
Arethusa bulbosa,
Gyrostachys plantaginea,
Comptonia peregrina,
Populus grandidentata,
Salix humilis,
Salix sericea,
Salix petiolaris,
Betula populifolia,
Betula pumila,
Castanea dentata,
Quercus nana,
Chenopodium polyspermum,
Sagina procumbens,
Sagina apetala,
Tissa rubra,
Castalia tuberosa,
Aconitum Noveboracense,
Hepatica acuta,
†*Thalictrum purpurascens,
Ranunculus fascicularis,
Ranunculus sceleratus,
Anemone quinquefolia,
Capnoides aureum,
Cardamine flexuosa,
Saxifraga Virginiensis,
Saxifraga Pennsylvanica,
Tiarella cordifolia,
Parnassia Caroliniana,
Sarracenia purpurea,
Ribes Cynosbati,
Ribes floridum,
Ribes rubrum,
Rubus odoratus,
Dilibarda repens,
Potentilla Canadensis,
Waldsteinia fragarioides,
Rosa blanda,
Prunus cuneata,
Lathyrus myrtifolius,
Ilicioides mucronata,
Acer Pennsylvanicum,
Hypericum ellipticum,
Helianthemum Canadense,
Viola ovata,
Viola rotundifolia,
Viola rostrata,
Myriophyllum tenellum,
Aralia nudicaulis,
Aralia hispida,
Conioselinum Chinense,
Sanicula trifoliata,
Cicuta bulbifera,
Hydroctoyle Americana,
Cornus alternifolia,
Cornus circinata,
Cornus candidissima,
Pyrola rotundifolia,
Rhododendron maximum,
Vaccinium atrococcum,
Oxycoccus Oxycoccus,
Trientalis Americana,
Fraxinus nigra,
Asclepias quadrifolia,
Asclepias Syriaca,
*Myosotis arvensis,
Monarda didyma,
*Veronica officinalis,
Galium verum,
Galium palustre,
Viburnum alnifolium,
Viburnum acerifolium,
Viburnum dentatum,
Viburnum cassinoides,
Diervilla Diervilla,
Dipsacus sylvestris,
Leontodon autumnale,
Hieracium Canadense,
Solidago hispida,
Solidago uliginosa,
Solidago Virgaurea,
Solidago juncea ramosa,
Aster Novi-Belgii,
Aster prenanthoides,
Gnaphalium uliginosum,
Erigeron annuus,
Carduus odoratus.

### *Plants from the East.*

*Typha angustifolia,
Panicum pubescens,
Poa brevifolia,
Carex bullata,
Carex æstivalis,
Carex alata,
Disporum lanuginosum,
Salix alba cœrulea,
Salix purpurea,
Betula lutea,
Quercus Prinus,
Bœhmeria cylindrica,
Polygonum Careyi,
Polygonella articulata,
Silene Caroliniana,
Thalictrum polygamum,
Bicuculla eximia,
Cardamine arenicola,
Cardamine rotundifolia,
Meibomia sessilifolia,
Linum Virginianum,
Vitis bicolor,
Pimpinella Saxifraga,
Seriocarpus asteroides,
Dœllingeria infirma.

### *Plants from the Southeast.*

Panicum elongatum,
Eatonia nitida,
Sedum telephioides,
Sedum ternatum,
Spiræa corymbosa,
Hypericum prolificum,
Lechea Leggettii,
Azalea lutea,
Vaccinium pallidum,
Vincetoxicum obliquum,
Phlox ovata,
Scutellaria saxatilis,
Stachys cordata,
Houstonia purpurea,
Houstonia tenuifolia,
Galium latifolium,
Solidago erecta,
Silphium trifoliatum.

### *Plants from the South.*

Asplenium pinnatifidum,
Polypodium polypodioides,
Pinus Virginiana,
Erianthus alopecuroides,
Andropogon Virginicus,
Chrysopogon nutans,
Panicum microcarpon,
Panicum commutatum,
Panicum dichotomum,
Panicum flexile,
Zizaniopsis miliacea,
Sporobolus asper,
Sporobolus vaginæflorus,
Trisetum Pennsylvanicum,
Sieglingia seslerioides,
Eragrostis capillaris,
Melica mutica,
Uniola latifolia,
Poa autumnalis,
Arundinaria tecta,
Cyperus ovularis,
Kyllinga pumila,
Rynchospora corniculata,
Carex Frankii,
Carex amphibola,
Carex styloflexa,
Carex Crus-Corvi,
Carex decomposita,
Carex Muhlenbergii Xalapensis,
Tradescantia pilosa,
Juncus scirpoides,
Stenanthium robustum.
Melanthium Virginicum,
Trillium recurvatum,
Trillium sessile,
Smilax ecirrhata,
Smilax Pseudo-China,
Smilax Bona-nox,
Dioscorea villosa,
Iris cristata, (*Japan*)
Pogonia divaricata,
Hicoria laciniosa,
Castanea pumila,
Quercus Marylandica,
Phoradendron flavescens,
Iresine paniculata,
Silene rotundifolia,
Silene regia,
Magnolia acuminata,
Clematis Viorna,
Trautvetteria Carolinensis,
Roripa sessiliflora,
Arabis Virginica,
Hydrangea arborcscens,

Liquidambar Styraciflua,
Malus angustifolia,
Baptisia leucantha,
Psoralea pedunculata,
Robinia viscosa,
Robinia hispida,
Stylosanthes biflora,
Meibomia virdiflora,
Meibomia arenicola,
Lespedeza repens,
Oxalis recurva,
Polygala brevifolia,
Tilia heterophylla,
Triadenum petiolatum,
Viola hastata,
Passiflora lutea,
Œnothera laciniata,
Gaura Michauxii,
Myriophyllum pinnatum,
Aralia spinosa,
Ligusticum Canadense,
Nyssa aquatica,
Oxydendrum arboreum,
Chioanthus Virginica,
Gentiana villosa,
Obolaria Virginica,
Vincetoxicum gonocarpos,
Cuscuta indecora,
Phlox paniculata,
Phacelia dubia,
Lippia lanceolata,
Synandra hispidula,
Stachys tenuifolia,
Salvia lyrata,
Clinopodium glabellum,
Kœllia cristata,
Lycopus rubellus,
Physalis viscosa,
Pentstemon Pentstemon,
Conobea multifida,
Buchnera Americana,
Bignonia crucigera,
Tecoma radicans,
Catalpa Catalpa,
Ruellia ciliosa,
Houstonia tenuifolia,
Spermacoce glabra,
Valerianella Woodsiana,
Legouzia biflora,
Lobelia puberula,
Lobelia leptostachys,
Adopogon Dandelion,
Lactuca villosa,
Nabalus virgatus,
Vernonia glauca,
Vernonia gigantea,
Elephantopus Carolinianus,
Eupatorium serotinum,
Eupatorium cœlestinum,
Kuhnia eupatorioides,
Chrysopsis graminifolia,
Aster hirsuticaulis,
Silphium terebinthinaceum pinnatifidum,
Brauneria purpurea,
Helianthus microcephalus,
Verbesina occidentalis,
Coreopsis major,
Carduus Virginianus.

### *Plants from the Southwest.*

Korycarpus diandrus,
Juncus Torreyi,
Veratrum Woodii,
Toxylon pomiferum,
Acnida tamariscina,
Delphinium tricorne,
Porteranthus stipulatus,
Baptisia australis,
Falcata Pitcheri,
Euphorbia dentata,
Euphorbia obtusata,
Æsculus octandra,
Rhamnus lanceolata,
Hypericum gymnanthum,
Ammannia coccinea,
Eulophus Americanus,
Ipomœa lacunosa,
Convolvulus repens,
Phacelia bipinnatifida,
Verbena Canadensis,
Ruellia strepens,
Nabalus asper,
Vernonia fasiculata,
Aster oblongifolius,
Erigeron Bellidiastrum,
Helianthus mollis,
Verbesina helianthoides,
Senecio lobatus.

## *Plants from the West.*

Panicum Liebergii,
Bouteloua curtipendula,
*Kœleria cristata,
Eragrostis trichodes,
Hordeum nodosum,
Juncus brachycephalus,
Allium stellatum,
Lilium umbellatum,
Habenaria leucophæa,
Silene alba,
Delphinium Carolinianum,
Stylophorum diphyllum,
Erysimum asperum,
Polanisia graveolens,
Sullivantia Sullivantii,
Trifolium stoloniferum,
Kuhnistera purpurea,
Meibomia Illinoensis,
Lechea stricta,
Vioia pedatifida,
Asclepias Sullivantii,
Cuscuta paradoxa,
Lithospermum angustifolium,
Verbena bracteosa,
Clinopodium glabrum,
Physalis lanceolata,
Afzelia macrophylla,
Lactuca Ludoviciana,
Ambrosia psilostachya,
Solidago rigidiuscula,
Solidago Riddellii,
Leptilon divaricatum,
Helianthus annuus,
Helianthus grosse-serratus,
Helianthus doronicoides,
Bidens aristosa,
Mesadenia atriplicifolia,
Mesadenia tuberosa.

## *A List of Plants Naturalized in Ohio, with Source.*

[Those naturalized in Australia as shown by Hooker (II, 1859) and Moore (1883), are marked A.]

| | | |
|---|---|---|
| | Syntherisma sanguinalis | Eu. |
| | Syntherisma linearis | " |
| | Panicum Crus-galli | " |
| | Ixophorus verticillatus | " |
| | Ixophorus glaucus | " |
| | Ixophorus viridis | " |
| | Ixophorus Italicus | Eu.-Asia-Afr. |
| A. | Phalaris Canariensis | Eu. |
| A. | Anthoxanthum odoratum | " |
| | Phleum pratense | " |
| A. | Alopecurus pratensis | " |
| | Agrostis alba | " |
| A. | Holcus lanatus | " |
| A. | Avena fatua | Eu. or Asia. |
| | Arrhenatherum elatius | Eu. |
| | Capriola Dactylon | " |
| | Eleusine Indica | Eu.-Asia-Afr. |
| | Eragrostis Eragrostis | Eu. |
| | Eragrotis pilosa | " |
| | Eragrostis major | " |
| A. | Dactylis glomerata | " |
| A. | Poa annua | Eu.–Asia |
| | Poa compressa | " " |
| | Poa trivialis | Eu. |
| | Festuca ovina | Eu.–Asia |
| | Festuca elatior | Eu. |
| | Bromus tectorum | " |
| A. | Bromus sterilis | Eu–Asia |
| A. | Bromus hordeaceus | Eu. |
| | Bromus secalinus | Eu.–Asia |
| | Bromus racemosus | " " |
| A. | Lolium perenne | " " |
| | Agropyron repens | " " |
| | Carex muricata | Eu. |
| | Hemerocallis fulva | Eu.–Asia |
| | Allium vineale | Eu. |
| | Lilium tigrinum | China–Japan |
| | Ornithogalum umbellatum | Eu. |
| | Muscari botryoides | Eu.–Asia |
| | Asparagus officinalis | Eu. |
| | Populus alba | S. Eu.–Asia |
| | Salix fragilis | Eu. |
| | Salix alba | " |
| A. | Salix Babylonica | Asia |
| | Salix purpurea | Eu. |
| | Morus alba | Eu.–Asia–Afr. |
| | Broussonetia papyrifera | Eu.–Asia |
| A. | Cannabis sativa | " " |
| A. | Urtica dioica | " " |
| A. | Rumex crispus | " " |
| A. | Rumex Acetosella | " " |
| | Rumex sanguineus | Eu. |
| | Rumex obtusifolius | Eu.–Asia |
| | Fagopyrum Fagopyrum | " " |
| | Polygonum lapathifolium— | Eu.–Asia |
| | Polygonum Persicaria | Eu. |

Polygonum Hydropiper......Eu.
Polygonum orientale.......India
Polygonum littorale—.............Western U. S.
A. Polygonum Convolvulus—..................Eu.-Asia
A. Chenopodium album.... " "
A. Chenopodium glaucum......Eu.
Chenopodium polyspermum. "
Chenopodium urbicum...... "
A. Chenopodium murale........ "
Chenopodium Botrys...Eu.-Asia
A. Chenopodium ambrosioides—..............Trop. Amer.
Chenopodium anthelminticum—......................Eu.
A. Atriplex hastata..Western U. S.
Salsola Tragus......Eu. or Asia
Amaranthus retroflexus—..............Trop. Amer.
Amaranthus hybridus—..............Trop. Amer.
A. Amaranthus spinosus—..............Trop. Amer.
Amaranthus blitoides—.............Western U. S.
Amaranthus crispus...Unknown
Amaranthus græcizans—..............Trop. Amer.
Mollugo verticillata—.............Warmer U. S.
Claytonia perfoliata—............Western U. S.
A. Portulaca oleracea—..........S. Western U. S.
A. Agrostemma Githago. Eu. N. Asia
Silene vulgaris.........Eu.-Asia
Silene Armeria..............Eu.
Silene noctiflora............ "
Silene conica............... "
Silene dichotoma............ "
Lychnis alba................ "
Lychnis Coronaria.......... "
Saponaria officinalis......... "
A. Dianthus prolifer........... "
Dianthus Armeria........... "
A. Alsine media..........Eu.-Asia
Alsine graminea..Can.-Eu.-Asia
Cerastium viscosum.........Eu.
A. Cerastium vulgatum......... "
Holosteum umbellatum. Eu.-Asia
A. Arenaria serpyllifolia—...............Eu.-N. Asia
Scleranthus annuus..........Eu.
A. Spergula arvensis...........Eu.
Tissa rubra............Eu.-Asia

Aquilegia vulgaris...........Eu.
A. Delphinium Consolida....... "
Delphinium Ajacis........... "
A. Ranunculus acris........... "
Ranunculus bulbosus........ "
Ranunculus repens.......... "
Berberis vulgaris.......Eu.-Asia
Papaver somniferum—......Mediterranean region
Papaver Rhœas.............Eu.
A. Papaver dubium............ "
A. Argemone Mexicana. Trop. Amer.
Chelidonium majus..........Eu.
A. Fumaria officinalis.......... "
Lepidium campestre......... "
A. Lepidium ruderale.......... "
Thlaspi arvense....Eu.-N. Asia
Alliaria Alliaria..... " "
A. Sisymbrium officinale " "
Sinapis alba...........Eu.-Asia
Brassica nigra......Eu.-C. Asia
A. Brassica arvensis............Eu.
A. Brassica campestris......... "
Coringia orientalis........... "
A. Raphanus Raphanistrum—...............Eu.-N. Asia
Raphanus sativus..........Asia
Barbarea Barbarea..........Eu.
Roripa sylvestris....Eu.-N. Asia
A. Roripa Nasturtium.. " "
Roripa Armoracia...........Eu.
A. Bursa Bursa-pastoris........ "
Camelina sativa............. "
Draba verna.......Eu.-W. Asia
Alyssum alyssoides.........Eu.
Hesperis matronalis....Eu.-Asia
Reseda lutea...............Eu.
Sedum Telephium..Eu.-W. Asia
Sedum acre.........Eu. N. Asia
Potentilla recta........Eu.-Asia
A. Rosa rubiginosa.....Eu.-C. Asia
Sorbus Americana....N. E. Am.
Malus Malus......Eu.-W. Asia
Cratægus Oxyacantha..Eu.-Asia
A. Prunus Persica............Asia
A. Medicago sativa............Eu.
A. Medicago lupulina.....Eu.-Asia
A. Medicago denticulata... " "
A. Melilotus alba......... " "
A. Melilotus officinalis..... " "
A. Trifolium agrarium..........Eu.
A. Trifolium procumbens....... "
Trifolium incarnatum........ "
A. Trifolium arvense...Eu.-N. Asia
A. Trifolium pratense.. " "
A. Trifolium repens....Eu.-Siberia

| | | |
|---|---|---|
| A. | Vicia hirsuta | Eu.–Asia |
| A. | Vicia sativa | Eu. |
| | Geranium columbinum | Eu.–N. Asia |
| | Geranium dissectum | Eu. |
| | Geranium pussillum | “ |
| A. | Geranium molle | “ |
| A. | Erodium cicutarium | “ |
| A. | Linum usitatissimum | “ |
| | Ailanthus glandulosa | China |
| | Croton capitatus | Western U. S. |
| A. | Euphorbia Helioscopia | Eu.–Asia–Afr. |
| | Euphorbia marginata | Western U. S. |
| A. | Euphorbia Peplus | Eu. |
| | Euphorbia platyphylla | “ |
| | Euphorbia Cyparissias | “ |
| | Cardiospermum Halicacabum | Trop. Amer. |
| A. | Malva sylvestris | Eu. |
| A. | Malva rotundifolia | Eu.–W. Asia |
| | Malva moschata | Eu. |
| | Callirrhoe involucrata | Western U. S. |
| | Abutilon Abutilon | S. Asia |
| | Hibiscus Trionum | S. Eu. |
| | Hypericum perforatum | Eu.–Asia |
| | Viola tricolor | Eu. |
| | Opuntia humifusa | Western U. S. |
| | Clarkia pulchella | “ “ |
| A. | Daucus Carota | Eu.–Asia |
| | Caucalis Anthriscus | Eu. |
| A. | Pastinaca sativa | “ |
| | Æthusia Cynapium | “ |
| | Pimpinella Saxifraga | “ |
| | Conium maculatum | “ |
| | Carum Carui | “ |
| | Ægopodium Podagraria | “ |
| | Lysimachia Nummularia | “ |
| A. | Anagallis arvensis | “ |
| | Vinca minor | “ |
| | Cynanchum nigrum | “ |
| | Quamoclit Quamoclit | Trop. Amer. |
| | Quamoclit coccinea | Trop. Amer. |
| | Impomœa purpurea | Trop. Amer. |
| | Impomœa hederacea | “ “ |
| | Convolvulus arvensis | Eu.–Asia |
| | Cuscuta Epilinum | “ “ |
| A. | Cuscuta Epithymum | Eu. |
| | Heliotropium Indicum | India |
| | Cynoglossum officinate | Eu.–Asia |
| A. | Lappula Lappula | “ “ |
| | Myosotis palustris | “ “ |
| A. | Lithospermum arvense | “ “ |
| | Lithospermum officinale | Eu.–Asia |
| | Symphytum officinale | “ “ |
| | Echium vulgare | “ “ |
| | Ajuga reptans | Eu. |
| A. | Marrubium vulgare | Eu.–Asia |
| A. | Nepeta Cataria | “ “ |
| | Prunella vulgaris | “ “ |
| | Galeopsis Tetrahit | “ “ |
| | Leonurus Cardiaca | “ “ |
| | Lamium amplexicaule | “ “ |
| | Lamium purpureum | “ “ |
| | Lamium maculatum | “ “ |
| | Lamium album | Eu. |
| A. | Melissa officinalis | “ |
| | Satureia hortensis | “ |
| A. | Origanum vulgare | Eu.–Asia |
| | Thymus Serphyllum | “ “ |
| | Lycopus Europæus | Eu. |
| A. | Mentha spicata | Eu.–Asia |
| | Mentha piperita | Eu. |
| | Mentha longifolia | “ |
| | Mentha aquatica | “ |
| | Mentha arvensis | “ |
| | Mentha sativa | “ |
| A. | Physalodes physalodes | Peru |
| | Solanum rostratum | Western U. S. |
| | Solanum Dulcamara | Eu.–Asia |
| | Lycium vulgare | Eu. |
| | Hyoscyamus niger | “ |
| A. | Datura Stramonium | Tropical Asia |
| A. | Datura Tatula | Trop. Amer. |
| A. | Verbascum Thapsus | Eu.–Asia |
| A. | Verbascum Blattaria | “ “ |
| A. | Elatinoides Elatine | “ “ |
| A. | Linaria Linaria | “ “ |
| | Veronica arvensis | “ “ |
| | Veronica agrestis | “ “ |
| | Veronica Byzantina | “ “ |
| | Veronica hederæfolia | “ “ |
| | Martynia Louisiana | Miss. Valley |
| A. | Plantago major | Eu. |
| A. | Plantago lanceolata | Eu.–Asia |
| | Plantago aristata | Western U. S. |
| | Plantago arenaria | C. Eu. |
| | Galium verum | Eu.–Asia |
| A. | Galium Aparine | Eu. |
| | Lonicera Caprifolium | “ |
| | Valerianella Locusta | “ |
| | Dipsacus sylvestris | Eu.–Asia |
| | Campanula rapunculoides | Eu. |
| A. | Cichorium Intybus | “ |
| | Lapsana communis | “ |
| | Leontodon autumnale | Eu.–Asia |
| | Tragopogon pratensis | Eu. |
| A. | Tragopogon porrifolius | “ |

| | | |
|---|---|---|
| A. | Taraxacum Taraxacum— | Eu.-Asia |
| A. | Sonchus arvensis | Eu.-Asia |
| A. | Sonchus oleraceus | Eu. |
| A. | Sonchus asper | “ |
| | Lactuca Scariola | “ |
| | Crepis tectorum | “ |
| | Crepis biennis | “ |
| | Hieracium aurantiacum | “ |
| A. | Xanthium spinosum | Eu. or Asia |
| A. | Xanthium strumarium | “ “ |
| | Gutierrezia Texana— | S. Western U. S. |
| | Amphiachyris dracunculoides— | S. Western U. S. |
| | Grindelia squarrosa— | Western U. S. |
| | Inula Helenium | Eu.-Asia |
| | Parthenium hysterophorus— | S. Western U. S. |
| | Eclipta alba | Trop. Amer. |
| | Rudbeckia hirta | Western U. S. |
| A. | Galinsoga parviflora | Trop. Amer. |
| | Helenium nudiflorum— | Western U. S. |
| | Helenium tenuifolium— | Western U. S. |
| | Dysodia papposa | S. Western U. S. |
| A. | Anthemis Cotula | Eu. |
| | Anthemis arvensis | Eu. |
| | Anthemis nobilis | “ |
| | Anthemis tinctoria | Eu.-Asia |
| | Chrysanthemum Leucanthemum | Eu.-Asia |
| A. | Chrysanthemum Parthenium— | Eu. |
| | Chrysanthemum Balsamita— | Eu.-Asia-Afr. |
| | Matricaria Chamomilla | Eu. |
| | Matricaria matricarioides— | Pacific coast |
| A. | Tanacetum vulgare | Eu. |
| | Artemisia Absinthium | “ |
| | Artemisia Abortanum | “ |
| | Artemisia annua | Asia |
| | Artemisia vulgaris | Eu.-Asia |
| | Tussilago Farfara | Eu. |
| A. | Senecio vulgaris | “ |
| | Arctium Lappa | “ |
| | Arctium minus | “ |
| A. | Carduus lanceolatus | Eu.-Asia |
| A. | Carduus arvensis | Eu. |
| A. | Onopordon Acanthium | Eu.-Asia |
| | Centaurea Cyanus | Eu. |
| | Centaurea nigra | “ |
| | Centaurea Jacea | “ |
| | Cnicus benedictus | S. Eu. |

The naturalized plants of Ohio number at present 304 species, of which 99 also flourish in Australia. With respect to sources of these later migrants 145 are European, and 103 are common to Europe and Asia, 15 are indigenous in Asia alone, while 22 are from western and south-western United States, 15 from tropical America and a few from various other countries.

The tabulated species, including only those shown by the summary table, constitute a little above 40 per cent. of the flowering plants, ferns and fern allies known to grow spontaneously in Ohio. The larger number have such a wide range that they have been at present omitted. The lists are collected in the following summary table, the percentages being computed upon the basis of approximately 1960 *species for Ohio :

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* Professor W. A. Kellerman writes that the new list of Ohio plants contains 2,025 numbers. This basis will change the percentages slightly.

## SUMMARY OF SOURCES OF THE OHIO FLORA.

| Direction of Source. | Number of Species. | Proportion to State Flora. | |
|---|---|---|---|
| From Northwest | 27 | 1.4 per cent. | |
| From North | 80 | 4.1 " " | |
| From Northeast | 145 | 7.4 " " | 12.9 per cent. |
| From East | 25 | 1.3 " " | |
| From Southeast | 18 | 0.9 " " | 15.1 " " |
| From South | 122 | 6.2 " " | |
| From Southwest | 28 | 1.4 " " | 7.6 " " |
| From West | 38 | 2.0 " " | 2.0 " " |
| Naturalized | 304 | 15.5 " " | 15.5 " " |
| | 787 | 40.2 | |

The composite character of the plants of Ohio is thus evident to any who may investigate the statistics of the area. The northern elements are larger than any other determined components. A study of the ranges of all plants found in the state as to extent north or south beyond Ohio will possibly increase the evidence heretofore offered in support of a northern origin for much of our flora.

Yet interesting as floristic studies may prove, the physiological adaptations of the plants to their present situations is equally enticing, and on the whole, better adapted for many reasons to meet the demands of both the local collector and the laboratory investigator. The time is certainly ripe for ecological studies in Ohio.

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BRITTON, Prof. N. L.—On the Geographical Distribution of North American Plants. Proc. Amer. Assn. Adv. Sci. XXXIX. (1890), 322-327.

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# Columbus Horticultural Society.

QUARTERLY JOURNAL OF PROCEEDINGS.

VOL. XIV. COLUMBUS, OHIO, JUNE, 1899. No. 2.

## PROCEEDINGS OF THE SOCIETY

### APRIL.

April 29, 1899.
G. A. R. HALL, WESTERVILLE, O.

Meeting called to order by President Lazenby.

Under the head of Committee Reports, Professor McFadden stated that the season had started unfavorably, but that by that time everything had about come up to the usual stage of advancement. He stated that upon the 11th of March the chick weed had been in blossom. He also showed five specimens of violets from the county.

Professor Lazenby called attention to the fact that nearly all of the fruit trees were in blossom at the same time this year—a very unusual occurrence.

Mr. Hine reported the currant worm at work and the leaves badly eaten. He said that the apple plant louse was not very plentiful, and that the rhubarb curculio was seen occasionally.

Mr. Phelps stated that the apple crop generally promised a full supply. Trees were blossoming very profusely. Many peaches were reported killed. Strawberry plants looking well. Prospects good for an abundant crop of gooseberries.

While some persons present seemed to be of the opinion that cherry trees were killed by the cold weather, others said that the the trees had never come through more vigorously.

The regular program was then taken up as follows:

"The Relations of Insects to Horticulture,"
Prof. Herbert Osborn.
"The Nesting Sites of Some of our Smaller Birds,"
E. B. Williamson.
(Read by Raymond C. Osburn.)
"The Kitchen Garden,"...............Prof. Wm. R. Lazenby.

An interesting discussion followed these papers, during which Professor McFadden mentioned the almost total disappearance of the tomato worm. They are kept in check by their natural enemies, the ichneumon flies.

Professor Lazenby reported some observations upon the activity of bees. They left the hive at the rate of 55 per minute during the hours from nine to four. He said that the pollen was nearly all collected during the morning. In the morning nearly two-thirds of them were pollen laden, while in the afternoon only one-tenth were pollen laden.

In the discussion of Mr. Williamson's paper, the general opinion seemed to be that we are not doing enough to encourage the increase of the numbers of our beneficial species of birds. Clearing, improved fences, etc., are all doing away with the nesting places for the birds.

Professor Lazenby said that he was glad to see the stand that was being taken against the collecting of birds eggs, especially by boys.

Professor Osborn said that he did not think that the collecting of eggs for scientific study and by scientists, should be interfered with.

After Professor Lazenby's paper, Mr. Sessions made some remarks upon City Lot Gardening.

The Society adjourned.

## MAY.

May 27, 1899.
HORTICULTURAL HALL, O. S. U.

Meeting called to order at 2:00 P. M., by President William R. Lazenby.

Under the head of committee reports Mr. Luke said another new sunflower had been added to the number of species from Ohio.

Professor Lazenby said: The time is passing away when the idea prevails that the world has just so many species and that the one who discovers them is a great scientist. He also called attention to the catalogue of Ohio Plants as Prepared by Professor Kellerman, and sent out as a university bulletin, and the Catalogue of the Sandusky Flora, prepared by E. L. Moseley.

Mr. Janney asked if the currant worm was an introduced species.

Professor Lazenby said it was.

Mr. Fulmer asked if the canker worm *anisopteryx* was a dangerous enemy.

Professor Lazenby read the method prescribed by the Ohio Experiment Station. The trees tested at that time were literally alive with the worm, and upon being sprayed with paris green, not a worm was to be found after thirty-six hours.

Professor Osborn said: *Anisopteryx vernata* is unusually plentiful this spring. Tree hoppers are very abundant. Honey locust is injured quite a little by the leaf hopper. It is particularly injurious to the young growths. *Macropsis* is also found abundantly.

Mr. Scott asked what has become of the Colorado potato beetle.

Mr. Sessions said: Last year I went over my crop six times. Twice to hand pick, twice with paris green and plaster, twice with paris green and water.

Professor Osborn: It is reported that the potato beetle effects the tomato.

Professor Lazenby: I have seen a bed of petunias nearly destroyed, and the egg plant is attacked by them quite as badly as the potatoe.

Mr. Sessions: How can apple seeds be kept?

Mr. Scott: They are kept over winter in damp sand and planted in spring.

Professor Lageman: We see an immense number of burdock. We should use them instead of importing the root from Europe.

Mr. Luke: There has been an unusually large demand for pansy plants this year, one dealer having sold 12,000 plants.

Canna roots are "shy," on account of an increased demand.

Melons out doors are somewhat damaged.

Bedding work has been interfered with by the cool weather; is probably one, and perhaps two weeks behind.

Mr. Scott: Isn't cool weather, at time of setting out, desirable?

Mr. Luke: It probably does no harm, as the plant will develop a strong root and gain all it will be supposed to have lost.

Mr. Streeper: Salsify, put in without digging the ground, merely raking it, is ahead of anything. I have shown to my satisfaction that this is the best way to grow salsify.

The regular program was then taken up as follows:

"Powdery Mildew of the Grape,".............E. L. Fulmer.
"Fungous Diseases of the Cherry,"........Edwin C. Cotton.

Mr. Scott: What causes the superfluous growths known as "birds' nest" in the hackberry?

Mr. Cunningham: It is caused by the attacks of both insect and fungus.

Professor Osborn: The insects come first and by their attacks make a good starting place for the fungus.

It was voted to have the next meeting at Grove City if possible. The matter was left in the hands of the Executive Committee.

Society adjourned.

## JUNE.

June 24, 1899.
HORTICULTURAL HALL, O. S. U.

Meeting called to order at 2:00 P. M., by President Lazenby.

Under the head of "Botany," Professor Lazenby showed some unusually large specimens of leaves. Leaves of the sycamore measured 19½ inches, linden, 11 inches.

Mr. Sessions showed a specimen branch of English ivy that had literally eaten out the mortar from between the bricks of a wall.

Professor Hunt stated that in northern Illinois the osage orange has been entirely destroyed by the cold of the past winter. In some places the cedars were also killed by the cold.

Mr. Sessions said that he had noticed the effect of the cold upon scions, there being a dark streak between the bark and the wood.

Mr. Janney showed some elm leaves covered with galls.

Mr. Sessions presented sections of the black locust showing the effects of the borer.

Mr. Streeper showed samples of fruit, among which were the Fay currant, Red Jacket gooseberry, Yellow Transparent apple (Russian). He also showed some potatoes dug on the first of June. The variety was the Early Rose, and the tubers were quite fine.

Mr. Sessions then made a short report upon the Potato Patch Plan as managed by the city.

The regular program was then taken up as follows:

"The Relation of Agriculture to the Progress of the Century,"
Thomas F. Hunt.

"Some Notes Upon the Forest Condition of Ohio,"
John F. Cunningham

Mr. Haywood told of seeing the operation of polishing plow shares by hand in the early thirties, etc.

Mr. Houston called attention to the fact that open drainage might effect the floods and sudden uprisings of water.

Professor Lazenby: If the farmers could be induced to regard the woods as a crop rather than a mine, the cause of forestry would be bettered.

Mr. Scott: I believe that the length of the time that land will be held by a family will govern the care of the wood land.

Professor Hunt: One thing that Mr. Cunningham did not bring out quite clearly is that his chart shows that in the last forty-three years two-thirds of the forest of the State have been cut off.

President Lazenby then announced that the next regular meeting would be in September. He said further, that he desired to have the meeting of the American Forestry Congress held under the auspices of the Society in August.

Adjourned.

# THE EDITOR'S TABLE.

This is the last number of the JOURNAL of the COLUMBUS HORTICULTURAL SOCIETY that will be published by the present editor. As has been oft quoted, "Time works wondrous changes," and although the change referred to here is not of such a wondrous nature, still it is a change, and other changes are sure to follow. In leaving the place in which relations and associations have always been so pleasant and profitable, we do so with the hope that the Columbus Horticultural Society will continue to prosper in the future as it has in the past and that it may become more and more influential in the county and state in controling the diffusion of knowledge relating to horticulture and agriculture. The Society is old ; the Society is strong ; but we cannot help feeling that it might be stronger as it increases in age, and that many might become interested in it and its work if they were only given the opportunity to become members.

From observations about the county it seems that this vicinity is more of a vegetable and small-fruit producing country than a large-fruit producing region. The apple crop seems to be exceptionally promising this year, as it is nearly everywhere. As a rule, however, large orchards are not common in this part of the county, and the apple crop is generally not much to speak of. Small fruits do fairly well where the proper soil is procured, and some vegetables do particularly well. The tomato seems to thrive. In fact this is the home of many of our most valuable varieties, as originated by the Livingston's, Seedsmen. Muskmelons do well as a rule, and seem to be doing well this year. One crop of small fruit can generally be depended upon to find a good home market, and that is the red raspberry. This fruit can not be shipped any great distance, and thus the home crop is generally sold at a good price. During the season just coming to a close, red raspberries sold as high as five dollars per bushel in Columbus.

The value of the work done by the Ohio Agricultural Experiment Station does not seem to be appreciated by all. This institution is supported by the Government for the good of the farmers of this, as well as other states, and those who do not receive the benefits of the investigation as carried on at the station are missing them through their own neglect.

The station staff is composed of men who know their business. They are working for the good of the farmers of the state, and not only do they want you to send to them for information, but any new sample of fruit, grain, or vegetable which may fall in your way should receive your attention to such extent that the station should know about it. The persons at the experiment station are gentlemen, and you will be treated as a gentleman in any correspondence you may desire to carry on with them.

During the coming meeting of the American Association for the Advancement of Science, the American Forestry Association will meet under the auspices of this Society. All members will be expected to attend this meeting and to take part in whatever discussions thay may be interested in. Notification will be given in due time for the meeting, and we will be glad to see all members present.

We are glad to see in *Vick's Magazine* for August a reprint of an article from the proceedings of our Society—the article on "Forcing Rhubarb in the Dark," by John F. Cunningham.

# GOOD THINGS FROM OUR EXCHANGES.

It is frequently supposed that almost any sort of bug, worm or spider that flies or crawls about is an insect, but strictly speaking a large proportion of these creatures are not insects at all. For example, a spider is not an insect; neither are the thousand-legged worms so often found under boards. In both these cases the creatures have too many legs to belong to the insect class. Spiders have eight legs, and the thousand legs a great many more, while the true insects have but six. The body of an insect is also divided into three principal regions—head, thorax and abdomen. A majority of them are also characterized by undergoing during their development a series of well marked changes or transformations. Such insects exist in four distinct stages, namely: 1, the egg; 2, the larva, or caterpillar; 3, the pupa or chrysallis; 4, the adult or imago. We may take for example the common cabbage worm; the white butterfly deposits singly or in clusters of two or three each, small yellowish eggs upon the cabbage leaf. These soon hatch into little green larvæ that feed upon the substance of the foliage; in about two weeks they become full grown, when they generally leave the cabbage plant and finding some suitable shelter—beneath a board or under the caping of a fence—change to chrysalids. They remain in this condition about ten days, when they emerge as butterflies.

—*C. M. Weed, before Mass. Hort. Society.*

A year ago the Ohio Experiment Station began a comparative test between cow manure, taken directly from the stable to the field in the spring, and manure of the same sort which had been allowed to lie in the open yard during the winter. The plan of the experiment is to apply both kinds of manure to land intended for corn, plow under at a shallow depth, and follow the corn with wheat and clover, without any further manuring. Four duplicate plots are treated with each kind of manure, applied at the rate of eight tons per acre, the treatment for each pair of plots being exactly alike in all other respects. The result thus far is that the corn of 1897 gave an increase of thirteen bushels per acre from the yard manure against sixteen bushels from the stall manure, and the wheat crop following has given an increase of ten bushels per acre for the yard manure against eleven bushels from the stall manure. Valuing the corn at thirty-three cents, and the wheat at eighty cents per bushel, and the straw and clover at three dollars per ton, the increase from the yard manure in the two crops has amounted to fifteen dollars per acre, and that from tho stall manure to seventeen dollars, an average of two dollars per ton for the manure, with further effect probable on succeeding crops.

The experiment is not yet quite fair to the stall manure, because the latter has been taken from bulls which had but little grain, whereas the yard manure was from cows that had been much more liberally fed.

—*Ohio Experiment Station—Newspaper Bulletin.*

It is sufficient to say, without giving details, that the Ohio Experiment Station has found that the locality where potato seed was grown is a matter of less importance than the manner in which the seed is kept, which is equivalent to saying that the condition of the seed before planting determines what the crop is to be, far more than does the latitude where the seed was produced. When equally well preserved from sprouting, our own seed potatoes have given as good results as those from either north or south. Cold storage, Ohio seed potatoes have given as good crops as those from Maine or North Carolina.

Cold storage is not convenient for all, however, and means must be adopted to obviate the necessity of it. The easiest plan is to grow seed potatoes late in the season by planting about the first of July.

To carry out this plan preparations need to be begun as early as the first of May. Ordinarily, potatoes will not keep in condition for planting until the first of July, but if they are taken from the cellar before they have begun to sprout, or when the sprouts are just starting, and spread out on the barn floor, or loft, or some place where they will receive a little light, they will throw out short, stubby, green sprouts, about half an inch in length, and then remain in that condition for months.

The potatoes must be only one layer deep, and, preferably, seed end up. All of the eyes will not throw out sprouts, and in cutting, the pieces should be larger than for spring planting.

—*Ohio Experiment Station—Newspaper Bulletin.*

There is no longer any question as to whether the orchard should be cultivated. Experience everywhere shows that cultivated orchards live longer, bear better and are more profitable than uncultivated orchards. Many of the experiment stations of the best fruit-producing States have tried uncultivated orchards beside those that were cultivated and have collected opinions of the most observant fruit-growers of their sections, and the considerate verdict in almost every case is that cultivation is necessary for healthy trees and first-class fruit. The principal orchardists of the State have expressed themselves on orchard cultivation. Out of 272 reports made to the Secretary of the State Horticultural Society, 130 advocate thorough cultivation till bearing time, and 130 urge continuous cultivation as long as it is possible to enter between the rows with horse and implement. Most of those advocating cultivation till bearing time only, live in the lower Kansas river district, where the soil is very rich, deep and moist and will produce fine crops of clover. The general practice in this district is to cultivate well till the trees are in full bearing and then seed to clover. West of Manhattan, clover does not succeed. Even if it should succeed it would not be profitable to sow it from the fact that all the moisture that falls in this region is required by the fruit trees, and any crop whatsoever simply robs them of the moisture they should have. For this region, then, clean and steady cultivation ought to be the rule for at least that part of the year including the dry season.

However, bare soil soon loses its humus and becomes infertile. This must be prevented. Here is one way of preventing it. Plow the orchard in the spring, cultivate both ways and keep all weeds down till September 1, at which time the soil will be in fine condition for a seed bed. Sow rye at the rate of two bushels per acre. This will cover the ground well before winter, and therefore protect the ground from blowing or hard freezing during the winter. Let the rye stand till knee high in the spring, then turn under and proceed with clean cultivation through the summer.

*Kansas Experiment Station—Newspaper Bulletin.*

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Where grapes are raised only in a small way for family use the birds and bees often get the most of them. To make sure of a crop some form of protection is necessary. The common way is by the use of bags. For this purpose strong manilla paper bags of the 1½ or 2-pound size are used. A piece is clipped off each of the bottom corners to let the rain run out.

As soon as the grapes are well set, a bag is slipped over each bunch and tied or pinned to the stem. Nothing further is wanted except to inspect them occasionally and replace any which may become torn.

The fruit is greatly improved in appearance by being grown in bags. The berries have a more delicate bloom and skin, and many people think the quality is improved. This method protects the grapes from all injury from insects, and if the bags are put on as soon as the grapes are set they will also diminish the injury from fungous troubles.

—*E. C. Powell, in National Stockman and Farmer.*

## RIPENING TOMATOES AFTER FROST.

An Eastern market gardener follows the method herewith described, as given in the *New York Tribune*, and finds it successful: When frost is imminent, or certain, the tomatoes are picked from the vines; all those that are large enough to ripen are laid carefully by themselves and then assorted; the largest and most fully developed ones it is an easy matter to ripen, but those that are green, requiring considerable time, are the ones really the most valuable. An old hotbed, with its glass sashes, is utilized for the tomatoes. Straw is put in the bottom to insure cleanliness and dryness. Upon this the tomatoes are packed in layers, the greenest ones in the bottom and those nearest ripe at the top. The sash is placed over the fruit, and is kept there on all cool nights. On warm days it is removed or lifted to admit air and to dry out any extra moisture that has accumulated. It will not be long before the first layer will have ripened sufficiently to be taken out and marketed. If the frost has destroyed most of those of other folks the price will already be rising, and no doubt a reasonable profit will be realized even from those first ripened in the hotbed.

# COMMUNICATIONS AND DISCUSSIONS.

## THE METROPOLITAN PARK SYSTEM OF BOSTON.

BY EDWIN MEAD WILCOX.

(Read by Prof. W. A. Kellerman.)

*Mr. President, Members of the Columbus Horticultural Society, Ladies and Gentlemen:*

When invited by your Secretary last summer to prepare a paper for the Society, it at once occurred to me that the above subject would prove of interest to your members. It is a pleasure to be able to address you even at so great a distance and through the voice of another.

A study of Boston's park system when embellished with local pride and considered as a purely and distinctly local institution would prove of no little value and interest. But when we consider the vast influence and stimulus to park making throughout the United States that the Boston park system has exerted, and its great significance as an educator of the people along these lines, the subject assumes uncommon interest. In fact no citizen of our country should be entirely ignorant of the lines along which park improvement has been moving. It is surely a matter for congratulation that in the rush for the material gains of this world such grand public improvements have been even contemplated by so many people. It is of interest to note these great attempts on the part of the people to provide means for the proper cultivation of both sides of their nature, the aesthetic and physical.

Obvious difficulties have presented themselves to me in preparing this paper to be delivered by another before your Society. I have omitted, as a matter of course, all non-essential details that would be of interest only to one acquainted with the entire system by actual observation. To such of you as have had an opportunity of going over a part of the Metropolitan Park System of Boston, I hope the following account may not prove entirely repetitive, and to those who have not had such an opportunity, I can not too strongly urge upon you to visit and examine our parks when they are at their best.

I must first of all give you a very brief account of the local physiography in order that you may properly understand the main natural features of the surface about Boston that have been blended into one system of parks. The " Boston Basin " is partially enclosed on the west by two great ridges formed by numerous hills. On the north we have the great series of hills extending from Waltham to Cape Ann, and popularly known as "Wellington Hills." On the southwest is located the ridge that has for many years been known as the "Blue Hills."

The northern ridge is broken, beginning at the northeast end, by the Saugus, Malden and Mystic Rivers. The average height of this series of hills is about 100 feet above sea level. The Blue Hills are a number of partially separate hills rising from 300 to 600 feet above sea level. They are of geological interest from the fact of being the highest land elevations, so near the Atlantic, from Maine to Mexico. From their sparsely wooded summits one can obtain a broad view of the entire Greater Boston and of most of the Metropolitan Park System, of which they form a most interesting portion.

From midway between these two ridges the Charles River flows slowly down to the Bay through the heart of the Metropolitan District, and in fine view of the homes of the "400" in the Back Bay District. To the south of the Charles the Neponset River enters the Bay from the southwest.

Throughout this area thus bounded by the ocean and these ridges, we have a great number of small hills and a number of shall natural lakes (mostly called ponds in this region), that have all been woven into the Park System.

Of the many islands in the Bay the largest is that called East Boston. The many connections with Boston proper, by ferry, electric and steam cars, renders this watery boundary line a scarcely perceptible barrier, though somewhat of an annoyance. A glance at the map gives one the impression that these smaller islands are leisurely escaping from the harbor through the "narrows" formed by the two great projecting peninsulas, *i. e.*, Winthrop on the north and Nantasket on the south. Only one of these many islands, *i. e.*, Castle Island, is at present in the charge of the Metropolitan Park Commissioners. Upon this island is located the United States Fort Independence, and the island is connected with the shore by a long gracefully curved pier.

The shore in the Metropolitan district presents a most remarkable variety of scenery—from the grand projecting cliffs at Marblehead and Nahant on the north to the beautiful stretch of sand at Revere Beach, and to the filth of the docks and shipping district of Boston and East Boston. The low salt marshes at various points along the coast and along the rivers already named are of great interest to the ecologist. Even the strong smelling "mud flats," of which we have several types, are not by any means neglected by our zoölogists. Farmers make good use of such deposits for fertilizing purposes, while impinging towns "discuss" methods of removing the nuisance. The "stern and rock-bound coast" has been made immortal in poetry while other features of great interest have been embodied in current geological literature. The pen of our own Professor Shaler has in a charming manner depicted many of the geological features of this region. To his works you are referred for such details. The peculiar glacial deposits known as "drumlins," have, many of them, been leveled down by the waves, to form a steep incline or cross section rising from the sandy beach below. The great boulders from these deposits, when scattered along the beach, offer favorite spots for great masses of Ascophyllun and Fucus to become attached.

Into this region of wonderously intermingled salt and fresh waters, marshes, peculiar glacial deposits, rocks and mud flats came the English colonists of the 17th century, and all of these, from Miles Standish at Plymouth, to Thomas Morton, of Merrymount, had nothing but praise for the scenery of the locality. And later when Standish visited "Squantum," a neck of land south of the mouth of the Neponset river, he regretted that the Plymouth Colony had not located there.

No matter whether one enters Boston by land or sea, the most prominent figure in the first view is sure to be the gilded dome of the State House, rising over a hundred feet above Beacon Hill, itself a prominent elevation. The "civilized" and "domesticated" electric current is now made to shed its radiance at night from the gilded dome down over the statue of Benjamin Franklin in the yard in front of the State House. You all recall that Franklin was a citizen of Boston during a part of his life.

Directly south of this historic State House is the Boston Common, and further west, across Charles street, is the Public Garden. The Common is now traversed with numerous macadamized paths above ground, and the subway under ground, through which several thousand cars pass each day. But in spite of these modern improvements the Common is now as of old, the play ground par excellence of the city. The Boston boys who complained to General Gage of the interference of his soldiers with their sports are represented by more numerous descendants and "visiting" boys of all nationalities. The Public Garden, with its graceful bridges over a picturesque little lake, is one of the most pleasing sights to be had in the city. The city is to be congratulated that no attempt to cut these up into building lots has proven successful or even met with popular approval for any length of time. The stately "sky-scrapers" must always stand guard about these little pieces of dame nature's handiwork.

These two parks, together with the abundance of natural scenery about the neighborhood, were amply sufficient for the needs of the scattered clusters of people that inhabited the neck of land that, in the old days, made all of Boston. Down the length of this neck throngs of people now walk along the narrow and sinuous Washington street, laid out as it would seem, in the tracks of the "primeval calf," who may have wandered through the woods down the neck to get a glimpse of the ocean. The Common was, in fact, until the establishment of Central Park, N. Y., the largest urban pleasure ground in the United States.

The park movement in this country may be said to date from the creation of Central Park, and to the landscape architect of this beautiful park, Frederick Law Olmsted, who by his great personality gave the first stimulus to the new movement, we, as Americans, owe much. He really may be said to have created a new form of park—one in which the natural beauty of the landscape is retained and enhanced, while all the charm of the locality thus preserved is protected and rendered permanent by the character of the design. The true landscape architect must be in no mean sense a prophet—predicting nature's work for the years to come, and at the same time catering to the present and future tastes and needs of the people.

Properly located drives and walks must pass the points of the greatest interest so that the whole can be made most easily accessible to the greatest numbers of people. Olmsted and his followers have clearly recognized also that amusement, recreation and entertainment must be provided in such a fashion as not to interfere with the main purpose of the park. A park should contribute to the development of the physical as well as aesthetic sides of man's nature.

The park movement was very slow in Boston compared with other cities, and this, I believe, was due in a large measure to the exceptional beauty of the landscape of the suburban cities and towns. But gradually the concentration of population began to render the small urban parks quite insufficient; while, at the same time, the irregular growth of suburban towns threatened to render the establishment of large suburban parks more and more difficult.

The leading public-spirited citizens of Boston and neighboring towns soon began to feel the necessity of united action in this matter from the growing feeling of common interest. The increase of rapid transit facilities soon made every town within ten miles of Boston a close suburb; and, in fact, these towns soon came to be the "bed chambers of the city counting rooms." Thousands upon thousands of people came to the city every day, attended to their business and returned to their suburban homes at night. The establishment of large parks within the corporate limit of Boston was now impossible, and quite undesireable owing to the already crowded condition and the rapidly increasing valuation of the land for business purposes. Moreover, the right of extra urban acquisition of desirable park land could only be exercised by a commission having the common consent and vested with full authority by all the cities concerned.

The shaping of public opinion in this direction was due to a few prominent citizens and to such organizations as the Appalachain Club and the Massachusetts Horticultural Society. To the latter Society—probably the most wealthy organization of the sort in the world—is due great credit for the active interest taken by it in this and other similar movements having at heart the improvement of Boston in all directions.

Mr. Sylvester Baxter, to whose extremely interesting work on this subject I am indebted for many valuable suggestions in this paper, said in a paper presented to the Massachusetts Horticultural Society in 1894, "It was in the course of a study of the conditions of the Greater Boston suggested by the facts of the census of 1890, made for the Boston *Herald*, that I had the honor to advocate, among the subjects that demanded treatment under some form of metropolitan administration—as the only method suited to the circumstances—the establishment of a system of metropolitan parks."

In April, 1890, the Appalachiam Club called a meeting of all interested in parks to meet May 24, 1890, in the Massachusetts Institution of Technology. The immediate result of this meeting was that in 1891 the Trustees of Public Reservations were incorporated by the legislature. The General Court of 1892 authorized Governor Russell to appoint a temporary Metropolitan Park Commission, to report upon the subject to that body. This temporary commission was appointed during the summer of 1892 and consisted of the following three persons: Charles Francis Adams, of Quincy; Philip A. Chase, of Lynn, and William B. de las Casas, of Malden. Charles Eliot (later of the firm, Olmsted, Olmsted &

Eliot), was appointed Consulting Landscape Architect, and Sylvester Baxter was secured as Secretary.

The report of this commission was made to the General Court in February, 1893, and in accordance with its recommendations the appointment of a permanent Metropolitan Park Commission, was authorized to take charge of the Metropolitan Parks District constituted by this act. This permanent commission consisted of Adams, Chase and de la Casas, of the old commission, and Abraham T. Richards, of Watertown, and J. J. Roche. The latter soon resigned and W. S. Chase, of Brookline, was appointed. The present members (1899), are W. B. de las Casas, Chairman; E. B. Haskell, T. C. Manchester, E. U. Curtis. H. S. Carruth was made Secretary, and the firm of Olmsted, Olmsted & Eliot was secured as landscape architects.

The territory placed in their charge by the aforesaid acts of the General Court included Boston and the following other eleven cities: Cambridge, Chelsea, Everett, Lynn, Malden, Medford, Newton, Quincy, Somerville, Waltham, Woburn, and the following twenty-five towns: Arlington, Belmont, Braintree, Brookline, Canton, Dedham, Dover, Hingham, Hull, Hyde Park, Melrose, Milton, Nahant, Needham, Revere, Saugus, Stoneham, Swampscott, Wakefield, Watertown, Wellesley, Weston, Weymouth, Winchester and Winthrop.

According to the census of 1890, all these cities and towns, including Boston, had a population of 880,000, or 40 per cent of the total population of the commonwealth. We can safely say to-day that over 50 per cent of the people of the State live within 10 or 12 miles of the capitol.

By this act the credit of the State was used to secure $1,000,000, the intention being to distribute the annual payments of interest and principal among the various cities and towns concerned, but since Boston would be the principal one to be benefited, 10 per cent was to be paid by it for the first five years. I omit the details of the subsequent appropriations for this purpose. I shall now enumerate and describe briefly some of the most important takings of this commission.

The first reservation made was that known as the "Beaver Brook Reservation," consisting of about 60 acres, situated in the towns of Waltham and Belmont. A generous gift of a Mrs. Atkins and her son covered over half the cost of the purchase. A glacial deposit called a "kame," forms one of the most interesting features of this reservation. Some of the finest specimens of oaks anywhere known are found on this kame. The beautiful cascade of Beaver Brook is the same that Lowell referred to in his beautiful lyric, "Beaver Brook." The picture to be had from the top of this serpentine shaped kame of the Beaver Brook flowing rapidly at its base is one of the most beautiful pastoral and still park-like landscapes in the neighborhood. Its association with the great poet renders it of peculiar interest to all visitors. Mr. Dame, in his "Typical Elms and Other Trees of Massachusetts, refers to the remarkable beauty of these oaks—now called the "Waverly Oaks." Some years ago the poet, Lowell, counted the annual rings of one of them, and found it to be 750. This locality formed one of his favorite haunts and much of his keen love of nature was surely stimulated by this beautiful "small pitcher" and the oaks of Beaver Brook region.

The second reservation made was that known as the "Blue Hills Reservation." The reservation includes practically all of the range of hills, and has about 4,000 acres. Eliot, in his preliminary report to the legislature speaks of this "as a park such as anything would be proud to call his own, a public forest possessing a vastly finer scenery than any of the great public woods of Paris can show, a recreation ground far surpassing in its refreshing value even London's Epping Forest."

There are eleven prominent summits in the total distance of five miles. The mountain-like character of the wooded hills gives the great reservation its most distinctive character. The hills possess a distinct historical interest from the fact that they gave the present name to the commonwealth. When Captain John Smith sighted the range from the bay in 1614, he called it "Massachusetts Mount." The bay soon came to have this name, and from that circumstance the State derived its name. Massachusetts, was an Indian name, meaning "the place of great hills." It is also of interest to note that these hills were once before the property of Boston, and were sold to private parties May 1, 1711.

At the southern foot of the tallest hill, Great Blue Hill, rising over 600 feet above sea level, is the beautiful "Hoosicwhisick Pond." From this peak one can see on clear days great distances—the near views are full of charm as well. The charming green meadows through which flows the Neponset turning to left and right and in the distance along the line of Blue Hill Avenue one can see the great green slope of Franklin Park. Old Hancock Hill in the Reservation was owned by Gov. John Hancock and the remains of his orchard can still be seen.

The pictures presented by the great old typical New England residences set back from the principal driveways are not easily forgotten. The great yellow hedges of barberry flowers in April form nature's gilded frames to these pictures. I cannot too strongly urge upon you to spend a day "afoot" on these hills—leave your bicycles at home and provided with lunch and a cane for climbing, the day will yield you a large dividend of true refreshment.

In the early part of 1894, the commission took nearly 1,600 acres known as the "Middlesex Falls" reservation. Adding to this nearly the same amount in charge of local water boards, etc., and a grand total of over 3,000 acres is now practically in charge of the Metropolitan Park Commission. The name "Middlesex Falls" was first suggested by Sylvester Baxter and it is well applied to this great wilderness reservation with its rocky granite hills and peaceful little lakes. To quote from the landscape architects "Here is a cliff and a cascade, here a pool, pond or stream, here a surprising glimpse of a fragment of blue ocean, or again a faint blue vision of a far distant mountain." Even the artificial ponds are not suspected of being due to man's handiwork until one happens to come upon the dam, hidden with the bushes and trees.

Among the early explorers of this region was Geo. Winthrop, who made the following entry in his diary—"Feb. 7, 1632. The Governor, Mr. Nowell, Mr. Eliot and others went over Mystic River at Medford; and going N. and by E. among the rocks about two or three miles, they came to a very great pond, having in the midst an island of about one acre, and very thick with trees of pine and beech; and the pond had divers small rocks standing up here and there in it, which they therefore called Spot Pond. They went all about it upon the ice. From thence (towards the N. W. about half a mile) they came to the top of a very high rock beneath which (towards the N.) lies a goodly plain, part open land and part woody, from whence there is a fair prospect; but it being then close and rainy, they could see but a small distance. This place they called Cheese Rock, because when they went to eat somewhat they had only cheese (the Governor's man forgetting for haste, to put up some bread)." "Just like a man" of course!

A great many foot and bridle paths make the Falls accessible to all, while several miles of beautiful Parkway renders a drive through the Fells along the shores of streams and lakes and under the great cliffs a memorable occasion.

The citizens of Lynn in the establishment as a public park of the so-called "Lynn-woods" gave perhaps the immediate incentive to the movement resulting in the formation of the Metropolitan Park System of Boston. Edward Everett Hale said of this "such is the gift which the good God, working through social history and natural history and statute laws and the heart of men, has given to the present and future people of Lynn." The city of Lynn in this reservation of wood has dedicated forever to public uses over one-third of its area. The district including over 300 acres of water surface and some of the most beautiful drives among sylvan beauty I have ever seen in this neighborhood. The "Glen Lewis" road is a favorite retreat for poets, lovers and other "simple folk" and all who love nature and rest from the every day hum drum of business cares.

Walden Pond, Glen Lewis Pond, Birch Pond and Breed's Pond are the four largest bodies of water within this reservation.

We can but mention in passing a few of the many romantic incidents in the history of these woods. Here it was that Hiram Marble and his son searched over twenty-five years for the treasure supposed to have been left here by the pirate Thomas Veal. The remarkable "ox-pits" are equal to any of the old Roman fables.

I come now to a discussion of the wonderful transformations made along the ocean shore before speaking in detail of the parkways and certain smaller parks within the city. The areas already described are "Reservations" in contradistinction to "Parks". The descriptions are sufficient indication of the distinguishing features of these two sorts of localities under charge of this commission.

The most important changes along the coast have been those at "Revere Beach." From a "squalid, shanty-covered shore" Revere Beach has been changed into the finest ocean-side pleasure resort for public use in the country and the improvements were wisely made on a very permanent and substantial character. Over $1,000,000 has been devoted by the Legislature to this improvement alone. The driveway, following the graceful three mile curve of the beach is a favorite resort for cycling and driving.

Here we have located the great metropolitan bathing establishment, with over a thousand dressing rooms. The charge for use of dressing room, bathing and suit, shower bath, etc., is but twenty cents, and during the summer season thousands enjoy these facilities daily. A stay of over twenty minutes in the water is not advised, and with expert bathers on hand to render assistance, accidents are reduced to a minimum.

In concluding the description of this portion of the park system I quote from the article by Sylvester Baxter, in Scribner's, for June, 1898, entitled "Seaside Pleasure Grounds":

"To the southward, the long, south shore of Massachusetts Bay loses itself in the distance. Before the beholder there spreads the open Atlantic, enlivened with the busy commerce of the second seaport in the Union. To the north eastward the rugged peninsula of Nahant* thrusts itself out into the surges, moored to the mainland, as it were, by the slender thread of its long neck, upon which the promontory of Little Nahant is strung like a bead; to the northward is Lynn, backed by a rugged range of rock hills—a picturesque combination of maritime, urban and wilderness landscape."

The above account of Revere Beach would be quite incomplete if no reference was made to the great popularity of the bath house aforementioned. During 1898 it was open from June 10, to September 20, and from 10 A. M. to 9 P. M. A total of 140,482 bathers are indicated, of which 90,439 were males, and 50,043 females. The largest number on a single day was 5,508, on August 7. The total receipts from the bath house during the same season was $26,142.80, which paid the running expenses and left a balance of about $5,000. I take occasion to refer here in this connection, to the excellent gymnasium privileges provided in certain parks in the center of the city. The men's gymnasium in the park called Charlesbank, and the women's gymnasium in the same park are patronized by a large number of people. Their location in the heart of the city, on the Charles river, renders the institution easily accessible to the laboring men of the city. These baths are the first public baths open in the city all the year around. If "cleanliness is next to godliness," a city can surely do no more religious thing than to provide an opportunity to its citizens to keep clean. Open air gymnasia are provided at Wood Island Park, and these are splendidly equipped.

The Commission has made wonderful improvements also along the Charles river and up as far as Newton Upper Falls the banks have fallen into public or quasi-public ownership. The many proposed takings along the Saugus, Mystic and Neponset rivers offer excellent opportunities for the erection of beautiful driveways, widening out here and there into small parks. Incidentally these takings solve the formerly perplexing sanitary problem of the pollution of all these streams.

The north bank of the Charles river (on the Cambridge side) has a beautiful boulevard in place of the old mud flats and filth incident to overflow of the Charles before the stone embankment was put in place. A proposed parkway connects this boulevard to Fresh Pond, in North Cambridge, and thence to the Middlesex Fells by either (*a*) Mystic and Spy ponds, or (*b*) Alewife brook. In either case the proposed parkway will pass through the Lowell Memorial Park—a portion of the Lowell estate recently purchased by the Commission, assisted by a fund raised by subscription.

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*The summer home of Senator Henry Cabot Lodge is located here.

We return now to a brief description of the municipal system of parks and parkways—the portion of the entire system most likely to be visited by a visitor here if his time is much limited. The municipal parks include over 1,300 acres (exclusive of the Public Garden and Common), and have cost about $12,000,000. Although the construction was authorized by a popular vote in 1875, the rapid improvement of the system began in 1887.

In brief, the municipal system consists of a number of well planned parks, each possessing individual characters and special recreative features connected by a chain of drives, rides and walks, forming a parkway over five miles in extent from the very heart of the city into the suburbs. A similar connection with the metropolitan reservations to the southward and northward is proposed.

This system of parkways commences at the Public Garden with the stately thoroughfare—Commonwealth Avenue. A planted space occupies the center and macadamized drives are on either side. The total width of the avenue is 200 feet besides a reserve space of 20 feet on each side, making a total of 240 feet between fronts of the buildings. The residences are all of the formal metropolitan type, forming a solid structure from street to street.

It may be well at this point to define certain terms we have used and will continue to use. According to F. L. Olmsted the term "parkway" is to be used when there is room but for one driveway through the reservation. This name "parkway" is best retained when the green strip on either side is reduced to a mere border. To quote his words "Parkways, like parks, may be absolutely formal or strikingly picturesque, according to circumstances. Both will generally be formal when they occupy confined spaces bounded by dominating buildings."

Of the formal type Commonwealth Avenue may be taken as a conspicuous example. But of the picturesque type the "Parkway," simply so-called in the following account, is the most important example to be found in the United States.

I quote now from Baxter's description of the Parkway:

"It originated in the artistic handling of an important engineering problem, as the most practical and economic form of development, And with its opportunities for diverse forms of recreation by land and water, it has already become one of the most popular of Boston institutions. The Parkway is a line of communication for pleasure purposes, distinguished by picturesque and continually varying scenery, with water-courses as the central feature for the greater part of its length and furnishing the leading motive of the design, the space here and there expanding into genuine parks. The remarkable delicacy of artistic perception which has guided the design of the Parkway is manifest in the way in which the successive sections form natural steps in the gradual development of scenic changes from the maritime, marshy character of the Fens to the rural and pastoral New England aspect of Franklin Park. The lower basin of the Fens, for example, is of the purely salt-marsh type, while the upper basin, with its frequent islets and more prominent bits of upland, recalls the landscape of the more inland reaches of marshy scenery on the coast."

The first section of this parkway is called Charlesgate and is so named from the water gate connecting the overflow of Stony Brook and Charles River.

It is an irregular water way with abrupt banks densely covered with trees and shrubbery enclosed between two roads named Charlesgate East and Charlesgate West, the street architecture making a formal frame for a bit of simulated wild nature crossed by Beacon Street, Commonwealth Avenue, and the Boston & Albany Railroad, with low-level and plain bridges without architectural features.

The second section, known as the fens, was designed to effect a drainage and sanitary improvement of vast importance. A basin had to be provided in the back bay district to hold the overflow waters of Stony Brook when high tide accompanied a severe rain storm. The final form is that of a characteristic New England salt marsh scene—a brakish stream, wandering "amidst fens with bosky banks."

I pass now rapidly along the changing scenery offered by the Parkway from the fens through Leverett Pond to Jamaica Pond. A boat ride (in boats provided at very reasonable rates by the city) over either of these ponds offers a new aspect of the scenery. I have often left my work and walked over to this spot from Cambridge as an after dinner stroll—a stay there until the electric lights are twinkling across the water well repays one for the dreary walk home in the dark.

We cannot pass Jamaica Pond without referring to the fact that on the south shore of the pond opposite Pine Bank, lived Francis Parkman, the historian of the French in Canada. Here a large portion of his histories were written, "he enjoyed the beautiful prospect, and as a skilled and scientific horticulturist cultivated his garden."

A short walk or drive brings one now to the famous "Arnold Arboretum." This is a department of Harvard University—the foremost scientific garden and "tree museum" in the world so near a great city. The total area is over 220 acres including remarkably diversified hill and valley country.

The following quotation from Baxter gives the present relationship of the Arboretum to the Metropolitan Park System:

"The Arnold Arboretum was established in its present shape by the co-operation of the city of Boston with the University. In consideratlon of its value as a feature of the park system and of the consequent enhancement of its educational importance, an agreement was made whereby the city constructed the roads and footways through the place and bound itself to maintain them and police the grounds, while the University assumed the care and maintenance of the remaining portion. This was accomplished through the taking of the entire area by the city by right of eminent domain and then leasing all but the space occupied by the roads and walks back to the University for a term of 999 years, for a merely nominal consideration. In this way about two and one-half miles of first-class park roads have been constructed through the Arboretum, and under an agreement made this year about a mile of additional roads will be built in the same way through the enlargement on the southward."

No visitor to the Arboretum should fail to walk or ride up to the top of Weld Hill both for the view it affords and the historic interest attached to it. About 200 yards away was the old "Peacock Tavern," Washington's favorite resting place. In this tavern Hancock lived when Governor. The "Weld Hill" is the point selected by Washington to fall back upon if it proved necessary in his siege of Boston.

Though the landscape effect is not at all marred by the order of planting of the trees the botanist could not fail to find that man had been at work in the arrangement of the groups of trees. Beginning with the Museum one finds the Magnoliaceae and then following in general the sequence observed in the Sylva, one finally comes to the Coniferae at the Water street entrance. In a small valley near the Forest Hills entrance there is a complete collection of shrubs arranged in the above de Candollean sequence with special reference to study.

Passing now under the beautiful three-arch stone bridge carrying the New York, New Haven & Hartford Ry, we pass by a lovely broad parkway to Franklin Park—the great rural park of the Municipal System.

This park has a total of 520 acres, but its compact shape, and composed of such extensive prospects of permanent scenery, gives it the effect of being much larger.

It was not until 1885 that the name "Franklin Park," was adopted in honor of Boston's most noted citizen, whose statue stands as already mentioned, in the State House yard, at the starting point of your "municipal" journey.

The whole purpose of this park is to afford to the mass of people that indefinable pleasure found in rural scenes not found in the confines of a busy city or workshop. In his "Notes on the Plan of Franklin Park," made as a report to the Park Commissioners in 1885, Mr. Olmsted said: "Scenery is more than an object or a series of objects; more than a spectacle, more than a scene or a series of scenes; more than a landscape, and other than a series of landscapes. Moreover, there may be beautiful scenery in which not a beautiful blossom, or leaf, or rock, bush or tree, not a gleam of water or of turf shall be visible. But there is no beautiful scenery that does not give the mind an emotional impulse different from that resulting from whatever beauty may be found in a room, courtyard or garden, within which vision is obviously confined by walls or other surrounding artificial constructions."

A large part of the Country Park so-called, is intended for small family parties that desire quiet to the eye and ear. Provisions have been made for the various games children would participate in and be benefited by in this portion of the park.

On "Schoolmaster's Hill" is a long terrace covered by arbors with vines on trellises and furnished with tables and seats. From here one can look out over the green turf of the Country Park—at once the quietest and most effective pastoral scene the park offers. The following inscription from a rock near the east end of the arbor explains the term "Schoolmaster's Hill":

"Near this rock, A. D. 1823-1825, was the home of Schoolmaster Ralph Waldo Emerson. Here some of his earlier poems were written; among them that from which the following lines are taken :

"Oh, when I am safe in my sylvan home,
I tread on the pride of Greece and Rome,
And when I am stretched beneath the pines
Where the evening star so holy shines,
I laugh at the lore and the pride of man,
At the sophist schools and the learned clan,—
For what are they all, in their high conceit,
When man in the bush with God may meet?"

To show the great variety of the provision for the pleasure of all who come to the park I will mention the fact that on the slope of Scarboro Hill a dairy is in time to be established.

Cows are to be kept in an apartment separated from the main room by a glass partition, as in the famous exquisite dairies of Holland and Belgium; and those who desire it are to be furnished with milk warm from the cow, as in St. James Park, London. Fowls are also to be kept and new-laid eggs supplied. This will meet the requirements of picnic parties, and supply the few simple refreshments needed by children and invalids.

The Playstead offers as its contribution a playground of thirty acres. The "greeting," when completed is to be a formal promenade ground with monumental architectural features here and there. The music court is to be a sylvan amphitheatre for concerts, while Long Crouch Woods is to be used as a zoological garden. For the full enjoyment of the entire park one naturally needs at their disposal a full day and sufficient love of exercise in walking to carry him over the ground.

With this fragmentary description of Franklin Park we simply mention an adjacent park, the Franklin Field. In the winter the great meadow is flooded and a very popular skating ground is thus provided by the city, and I might say in this connection that the Boston Park Commission have adopted the policy of keeping the ice in the parks in good condition for skating throughout the winter. One has only to notice the signs on the street cars to discover where the best skating is located at anytime. During 1897 there was a total attendance during the season at four of these skating grounds, of over 400,000 persons. Wornout surfaces are replaced by spraying, and every effort made to furnish the most pleasure possible.

In conclusion I refer again to Marine Park, located at City Point and Castle Island, in South Boston. This terminates a projected system of parkways extending north-east from Franklin Park. The greatest rendezvous for yachting in the United States has for years been here at City Point. The park boat service offers opportunity for recreation of this sort on the bay among the pleasure craft moored there. A great pier for a promenade, and picturesque building for bathing and containing restaurants, etc., complete the provisions for one's enjoyment. The busy scenes about Castle Islnd during the war have given way to respectful peace and quiet.

I have neglected to state that the Hyde Park and Stony Brook's Woods offers a direct connection from Arnold Arboretum to the Blue Hills Reservation. Stony Brook's Woods includes nearly 100 acres.

I have omitted also purposely to give all details of the financial arrangements involved in what you have seen to be a stupendous system of parks and parkways. The total State appropriations to date amount to $7,963,106.99, all of which is to be apportioned among the cities and towns according to benefits received, as determined by an impartial committee to be appointed by the Governor. A total of 7,904 acres are now reserved by the Metropolitan Park Commission, and an equal amount must be added to this to include the proposed takings and lands not included in the above amount but now controlled by various local corporations.

Up to this time the members of the Commission have served without salary, and what is of greater significance in these days of "West Side sewers" and "Scioto dam" questions, without charge of dishonesty. "The idea of adequate public reservations has taken firm possession of the popular mind," says the Commission in their report just published (1899). The magnificent park system has, therefore, in this respect, done a great educational work.

According to Chapter 550 of the acts of 1896, Section 1: "The Metropolitan Park Commission shall, prior to the first day of January in the year nineteen hundred, take all the lands which it is authorized to take, and shall lay out and construct all the parks, reservations, boulevards and other works which it is authorized to lay out and construct." The object of this resolution is to enable the apportionment of the total cost to be properly distributed among the various cities and towns at that time. Further progress will of necessity be made in a conservative and not sporadic fashion.

It is of interest to note that in spite of these great withdrawals of land the assessed valuation of the metropolitan district is now (1898) $176,000,000 greater than in 1893.

"The realization of a system of metropolitan parks for Boston, within three years of the time when the first definite suggestion to that end was made, furnishes," said S. Baxter, "one of the most striking instances of the remarkable responsiveness of public sentiment under modern conditions, when the right chord chances to be struck at the right moment."*

The people of Boston and suburban cities are to be congratulated for the foresight shown in thus providing for their own pleasure and that of generations to come. And the Metropolitan Park Commissioners and their landscape architects deserve great credit for the results obtained. At last Boston has a park system that must be compared with that of London and Paris rather than directly with that of any city in this country. Our system excels in the perfection of details and the extent of territory under control.

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* Mass. Hort. Soc., 1894, Part 1., p. 132.

I hope I have aroused in you a deeper interest in the present very unsatisfactory park system of Columbus, by this description of the "Hub's" accomplishment in this direction. Of course Columbus cannot bring the ocean to it, erect its own Blue Hills, or convert the shallow Olentangy or Scioto into a Charles or Neponset, but she can at least give decent attention to such simple matters as now confront her present park superintendents.

## POWDERY MILDEW OF THE GRAPE.

(*Unoinula Necator.*)

BY E. L. FULLMER.

This plant is a fungus, a parasite, growing upon the vine and also upon a species of Ampelopsis. The fungus body consists of long branching light-colored, thread-like hyphæ which is called the mycelium. This mycelium does not penetrate the tissue of the plant, but confines itself to the leaves, fruit, and green twigs. The numerous hyphæ, or threads of the mycelium, however, are attached to the surface of the plant by flat discs from which small suckers grow into the epidermal or outer cells. These suckers enlarge into sac shaped bodies called haustoria (fig. 3), which take up nourishment from the cells for the use of the fungus. These haustoria not only take material from the cells, but also set up a sort of fermentation in the protoplasm by which its compounds are broken up. This action often extends into cells adjoining those in which haustoria are found. The haustoria usually take only a portion of the cell contents, but since they break up the protoplasmic compounds the normal function of all cells affected is disturbed. The cells may be killed outright or they may take on a different form. When the epidermal cells of the plant are destroyed the cells underneath can not perform their function properly, hence the attacked leaves will shrivel up in time and fall off. The grapes usually continue to grow until the coat ruptures, after which they are generally attacked by the rot.

As above noted, the grape mildew attacks but two or three species of plants. As a rule fungi have one or more definite host plants upon which they work, and can live upon no other. Other plants may be protected against their attacks by a thick corky epidermis, or by various other means.

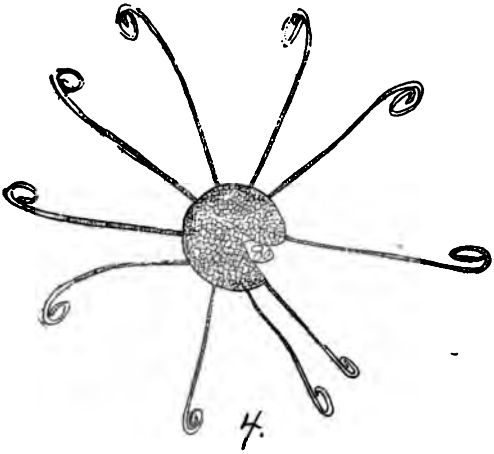
But the fact of a fungus being limited to particular host plants is explained in the majority of cases by the different chemical compositions of the protoplasm of cells from different plants; the cells from its own particular hosts being the only ones whose protoplasm it can break up into the proper food compounds for itself. The fungus thus seems limited to its host on account of its food supply rather than by any mechanical device on the part of the plants. It is true, however, that the mildew does not find a vigorous healthy plant so easy a victim as an unhealthy one.

Two methods of reproduction occur in the mildews. Or we may say there are two forms of spores; the summer spores and the winter spores. The summer spores are formed asexually. A branch from a hyphæ rises up and abstricts spores at the top (Fig. 1). These are formed very rapidly in damp, hot weather, hence such weather favors the spread of the mildew. As soon as the summer spores are mature, which requires but a few days at most, they are capable of germination, and since they are so small and light they are scattered about by the wind and dust. Insects, too, may be the means of carrying the spores not only from leaf to leaf and from vine to vine, but also from one vineyard to another.

The winter spores of the mildew are produced by a sexual process. They are called winter spores because they are matured in the fall but do not germinate until the following spring. They are thus the means of carrying the fungus over winter. The sexual reproduction of the mildews is not well understood. However, two branches arise from the mycelium and grow about one another. From this union a globular body, called a perithecium (Fig. 4), is produced. It is quite large, visible to the unaided eye, of a dark color, and has appendages which are coiled at the tip, going out in all directions from itself. Each perithecium contains from four to ten sac-like bodies called asci (Fig. 5), within each of which are from four to eight spores (Fig. 6.). These perithecia remain upon the fallen leaves over winter. By the following spring they are somewhat decayed and some of the spores may be blown upon the young leaves of the vines, thus starting the disease anew.

Some varieties of the grape are more susceptible to the attacks of the mildew than others. The European varieties suffer, perhaps, the most from it. It is not very injurious to grape culture in the United States, but in Europe it causes heavy loss.

Since it confines itself to the exterior of its host it is not difficult to combat. A great deal may be done by selecting



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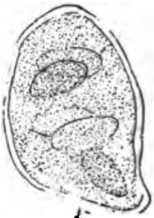

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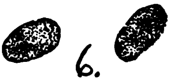

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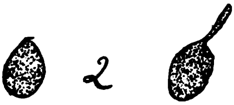

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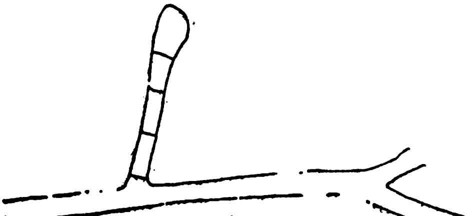

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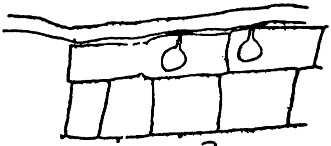

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varieties not liable to be attacked. If the vines are affected one season the leaves and fallen fruit having the winter spores upon them may be burned. The Department of Agriculture, and also the Ohio Experiment Station recommended spraying the vines with Bordeaux Mixture; the first spraying to be made just before the blossoms open, the second just after the fruit has set, and a third some two weeks later.

It is of interest to note that as small as the hyphæ of the mycelium are they are attacked by another fungus, the hyphæ of which ramify through these.

### EXPLANATION OF FIGURES.

1. Hypha of the mycelium.
2. Summer spores.
3. Haustoria in epidermal cells.
4. A perithecium, 175 diameters.
5. An ascus, 900 diameters.
6. Winter spores, 900 diameters.

## SOME FUNGUS DISEASES OF THE CHERRY.

BY EDWIN C. COTTON.

In this paper we shall consider the cherry from the standpoint of a host plant for parasitic fungi. Although the cherry has been cultivated for about 2,000 years, being first cultivated in temperate Europe and Asia at that date, and is now very widely distributed over our entire country, and nearly all parts of the north temperate zone (nearly every farm door-yard, and even the crowded back-yard of the city dweller has its cherry trees in greater or less numbers), yet it gets about as much neglect as falls to the lot of any variety of cultivated fruit. About the only care it gets from the average farmer is the annual pruning which comes at the time the fruit is ripe, and this it gets by accident, as it is generally done by the small boy while after the largest, juciest and most luscious cherries, which always grow on the topmost twigs. When we stop to consider the abuse and neglect that these servants of mankind have to bear, we wonder that there are any trees left, as all of the conditions are conducive to the best development and multiplication of insect enemies and fungus growths. The cherry and plum are very closely related in structure and ancestry, both belonging to the same genus, and being closely related are therefore subject to nearly the same diseases, yet the number of described and catalogued diseases of the plum is considerably greater than those of the cherry. Probably this is due in part to the plum having been much more thoroughly studied, because of its greater economic value.

Of the twenty or more fungus diseases which have been described as effecting the cherry, only about half·a dozen are of any economic importance from the horticulturist's point of view, that is, that seriously affect the profits from the crop, and perhaps the worst of these is the *Brown rot*, caused by a fungus, *Monilia fructigena* by name, which we shall consider first. It is the most wide-spread and destructive of all the diseases that affect the cherry. This malady occurs throughout the entire country and the losses resulting from its ravages are frequently very great. This is especially the case if a few days of wet, rainy weather prevail at about the time the fruit is ready to pick. Sometimes in such cases the whole crop will rot on the trees in a very short time. Nearly all fruit growers are probably familiar with its effects, but few know the cause. Mycologists, however, have known for a long time that it is due to the presence of a minute parasitic fungus, which, owing to its wide distribution, together with the fact that it is found on quite a number of pomaceous and other fruits, has received a number of names. It was first described by a German (Von Thumen), in 1879. In 1885 it was again made the subject of a paper, this time by W. G. Smith. Since that time it has been quite thoroughly studied, and is now known not only to attack and destroy the mature fruit, but also the immature and sound fruit, leaves, flowers, and even the young branches.

The fungus first makes its appearance on the flowers soon after or about the time the petals fall. At first a slight discoloration appears at a given point ; this rapidly increases in size until at length the entire flower assumes a brownish hue. After killing the flower the fungus frequently attacks the pedicles, where it produces similar discolorations to those upon the flower. The dead flowers usually remain on the trees for several weeks, then if the weather is wet they begin falling, and as they consist at this time of a soft mass of rotten tissue they stick to any part of the tree with which they come in contact. Many fall upon the leaves and young fruit and become so firmly attached that an ordinary rain will not dislodge them. At this stage they are highly infectious, and careful experiments have shown that whenever these flowers touch the leaves, or fruit, decay sets in. On the leaves the presence of fungus is first made manifest by a slight discoloration of the tissue around the point of infection ; this gradually enlarges, and at the same time the normal healthy, green color changes to a reddish-brown. During wet weather these spots on the upper surface are frequently studded with little tufts of the fungus ; these are the *conidiophores* or one of the fruiting stages of the parasite. They are the only parts that come to the surface, the myceliun being wholly within the tissue.

As in the case of the leaves the fruit is often infected by means of the diseased flowers. At first there appears a circular, brownish spot on one side of the cherry, this rapidly enlarges and soon the whole fruit becomes brown, shrunken and soft. Ultimately the stalk which supports the fruit is attacked and finally the whole, the stalk and the fruit, either falls to the ground and dries up, or remains hanging on the tree throughout the summer, or as frequently happens, till the following spring. The fruit is often covered with tufts of conidiophores, and while in this condition is highly infectious, causing all the fruit with which they come in contact to rot. The spores of this parasite are very tenacious of life, as are the spores of most of the parasitic fungi. Spores from cherries which had hung on the tree for a year germinated readily in moist air, and when sown on the young leaves and flowers they soon developed to such an extent as to produce the characteristic discoloration.

*As to Remedies.*—A knowledge of the nature and habits of this fungus enables us to suggest several ways of combatting it. In the first place the fruit killed by the parasite should never be allowed to remain on the trees over winter, but as soon as the leaves fall, these mummies as they are called should be removed and destroyed, either by burning or by burying. It would also be well to burn all old twigs and leaves that may have collected under the trees.

It is quite probable that some of the spores live over winter in crevices in the bark and in order to destroy these the trees should be sprayed in the early spring, before the buds begin to expand, with a solution of either *copper* or *iron sulphate*, and later after the petals fall wilh *sulphuretted potassium.*

The leaf blight, or "shot hole fungus" would probably come next in order of economic importance. This leaf trouble is very probably caused by the same fungus that causes the leaf blight of the plum—*Cylindrosporium padi* (Karst).

The disease is most noticeable from the middle of June to the end of the season, during which time the leaves frequently present a spotted appearance. The spots caused by it will, later in the season, fall out, giving the leaves the appearance of having been used as a target. The affected leaves soon fall off and complete defoliation of the tree may occur. Generally when this defoliation occurs during the growing season, new leaves will be put forth, and the fruit buds that were to produce the next year's crop, will open, thus cutting off this crop and inducing a growth of new wood that cannot ripen properly and will therefore be very liable to winterkill. On plums this disease is much worse, as the leaves sometimes fall before the fruit is mature, thereby causing the loss of two crops. This malady is probably the most destructive when it attacks nursery stock, as the conditions are more favorable to its wide distribution. Spraying with dilute bordeaux mixture is said to have very good effects.

The black-knot is not so serious an enemy of the orchardist as either of the above, as it only attacks to any serious extent, the common late sour cherry and fortunately they are not being set out very extensively at present. This fungous disease is caused by the black-knot fungus. (*Plowrightia Morbosa*, Schw.) It is a contagious disease and is spread by the spores. In summer by the summer spores and is carried over winter by the ascospores formed in the external portion of the knots. The winter spores or ascospores do not develop until late in the winter and are distributed by the bursting of the spore cases in the spring. From this much of the life history of the fungus one can readily see how it can be combatted to the best advantage. All that is necessary is to gather and burn all of the knots twice a year, just before each of the two crops of spores are matured.

Perhaps the next in order of destructivess is the powdery mildew, caused by *Podosphæra tridactyla.*

The Mildews form a group of parasitic plants which attack host plants belonging to a large number of genera, and are also quite variable in their microscopic characters. These facts have led to its receiving several names from botanists. It was first named by De Candolle who found this species on the Hawthorn (*Cratægus Oxycantha*).

This fungus occurs commonly in the eastern and central portions of the United States and is reported from the Rocky Mountains and California.

Young cherry trees are the chief sufferers from its attacks, but it also does considerable damage to the peach and to young apple trees in the nursery and occasionally seriously injures the quince.

It is as I said before of very common occurence, but fortunately does not get under headway until the trees have made their season's growth and are past serious injury. It has been found on sixteen different species of Rosaceæ, including both the wild and cultivated cherries and plums, the apple, crab-apple, quince, hawthorn, hard-hack, shad-bush, vaccinnium and the persimmon, showing a wide list of host plants.

The disease has been noticed in Missouri as early as June 1st, but usually does not develop sufficiently to attract attention till July.

During the latter part of summer it reaches its greatest development. It is first noticeable on the young leaves and tender shoots, as small, whitish, irregular blotches, having a radiated appearance. The spots soon spread and run together, covering indefinite portions of the foliage, or more often running over the entire leaf. As the fungus spreads the radiated appearance disappears. The threads of mycellum meantime branch profusely, and cross each other in all directions, forming an even white felt, which may be very thin or so dense as to entirely conceal the green color of the leaf. The denser portions then become covered with a whitish powder and still later the threads give rise to minute, black, spherical bodies (spore cases) just visible to the naked eye.

The fungus grows on both sides of the leaf, in some cases indifferently on either surface, but usually a decided preference is shown for one only.

On one tree the upper side of the leaves will be badly infested while the under side will have scarcely a trace of it. Another tree, perhaps in the same orchard and only a few feet away, will be badly mildewed on the under with little on the upper.

The principal damage to fruit trees results from the attacks on the growing tips and young leaves. Here the coating of fungus is usually quite pronounced and the mealy appearance quite prominent.

The most destructive form of the fungus usually bears but few of the spherical spore cases, and often fails to produce any before frost puts an end to the season's growth.

One investigator, while working on the grape mildew several years ago, found on some specimens small bodies very much resembling the winter spore bearing bodies (*Perithicum*), but more delicate, thinner walled, lighter colored and made up of smaller cells. These are not of a constant size, or shape, but are usually ovate or elliptical, and under pressure, discharge from the apex numerous elliptical spores. For a time these were thought to be a part of the fungus, that is, one of the spore-producing bodies, but now it is known to be a parasite on the mildew. We have here then a case of a parasitic fungus growing on another parasitic fungus.

The mildews, as a family, thrive best during warm, dry weather, and this particular species seems to be no exception to the rule. A light rain, giving the conidia or spores a chance to germinate, followed by a dry spell is probably the best conditions for the rapid development of the fungus. On the other hand seasonable rains and other conditions favoring the normal thrifty growth of vegetation, are probably the conditions least favorable to the growth.

It is a question whether the greater development of the fungus during a dry season is due to the direct action of these conditions on the fungus itself, or whether the explanation is to be found in the weakened vitality of the host plant.

On account of their manner of growth, the mildews which grow almost entirely on the outside of the leaf, are easily reached and destroyed by the use of fungicides.

A disease that has caused considerable damage to the cherry trees in Germany is what is known as *Witches brooms*, caused by *Exoascus Cerasi* (Funk). This disease resembles in general appearances the "witches broom" on the hackberry. I can find no record of its having been found in the United States.

A German authority writes as follows: It produces witches brooms which may be large, upwardly directed, bush-like and very conspicuous structures, with numerous thickened and elongated twigs; or they may be small, hanging bunches of twigs with upturned free ends. The leaves are somewhat wavy, slightly crumpled, and reddish, and fall off prematurely.

The brooms are visible at a considerable distance in the winter, while they are even more conspicuous during the following season. At the latter time, before the leaf buds open, the cherry trees are normally covered with white blossoms, while the brooms bear leaves only and rarely bloom. Each tree may bear several brooms, and every tree in an orchard may be attacked so that the disease has assumed considerable economic importance As a preventive measure the removal of all of the brooms at the time of pruning is strongly recommended.

There is still another disease to which considerable importance is attached, namely, the "Gum flux." This disease is also caused by a fungus, *Ascospora byerinckii*. It is to a certain extent a saprophyte, and is thought by some to gain entrance to the host only through wounds. The only practical remedy is to cut and burn all affected trees.

There are a few others, most of them effecting the leaves or branches, but it would take too long to enter into details, therefore I will not attempt to treat of them.

# THE RELATION OF AGRICULTURE TO THE PROGRESS OF THE CENTURY.

BY THOMAS F. HUNT,
*Professor of Agriculture, Ohio State University.*

In these closing days of the century, the progress of the nineteenth century is a favorite theme for the writer and speaker as well as a common subject of discussion at the fireside. The marvelous progress in wealth ; in bodily and home comforts ; the great progress and diffusion of knowledge are subjects of every day notice and ever recurring wonder. Your grandchildren now know more at ten years of age of physics and other sciences which contribute to the happiness and well being of the race than your grandparents did at seventy.

Our textile, iron and steel industries, our hotels, our newspapers, our railroads, our express companies, our street railways, our bicycles, our postal service, the telegraph, the telephone and the other graphs and phones, the manifold and ever increasing application of steam and electricity to the arts and industries of life deserve all the praise that the orator can give them and they deserve to be presented over and over again to our children in the quiet of our fireside.

It is not my purpose, however, to-day to speak of these things, but to speak without any of the artifices of the orator of the relation of agriculture to this Baron Munchausen progress. My theme is one that might command the abilities of the most gifted orator, but from the lack of ability I must be content to present my subject in a simple and straightforward fashion.

THE IMPORTANCE OF AGRICULTURE.—Agriculture is the basis of all prosperity. An abundant production of the field is our richest inheritance. "The first necessity of mankind," says Atkinson, "is an abundant supply of food material," which is strikingly illustrated by the fact that, to-day, nearly half the service of the railroads consists in moving food materials. As surely as agriculture is the basis of all prosperity, just so surely has the advancement in agriculture been a factor in this wonderful nineteenth century's creation. It would be too much to claim that agriculture alone has been responsible for this progress, because it is the result of every force existing or which ever has existed for the betterment or degradation of human society, but, in my judgment the progress of agriculture has played a much more important part than is generally recognized or conceded.

THE SIZE AND GROWTH OF UNITED STATES.—At the beginning of this century half the present territory of the United States was under the Spanish flag. The United States nowhere crossed the Mississippi and nowhere touched the Gulf of Mexico. It now extends from Maine to the Phillipines and from Alaska to Porto Rico. It has an area twice that of the old Roman Empire and three-fourths that of the whole continent of Europe.

In the year that Ohio was admitted into the Union, there was no State with one-fourth the present population of Ohio nor any city one-fourth the size of Cincinnati. Chicago, which did not then exist, contains over a million and a half of souls. New York and Brooklyn combined did not then have a population half the size of Columbus; while to-day Greater New York ranks second only to London. But the growth in population has not been confined to the Western Hemisphere. We love to talk of our wonderful growth in this country and we may be pardoned for doing so, but let us remember that the increase in population of Paris since Chicago was founded has been greater than the present total population of Chicago. Let us remember that the increase in population in London in one hundred years has been greater than the total population of Greater New York. Let us remember that there was but one city on the Western Hemisphere that had a population in 1890 equal to the increase in population of Berlin since 1800. There must be some cause for this marvelous growth of population and especially of our great cities on both continents. Perhaps what I may say later will in some measure explain it.

Nor has this growth ended. No man can predict the result except perhaps as did the small boy. The polite visitor said to the five-year-old boy: "My little man what will you be when you grow up." The small boy pondered over the question awhile and gave the only certain answer possible. "I'll be bigger, sir," he replied.

IMPROVEMENT IN PLANT PRODUCTION.—When the century opened, the American farmer had tried every plant which is now of sufficient commercial importance to be enumerated in the census with one or two trifling exceptions of which sorghum may be mentioned. No remarkable improvement has been made in the varieties of our staple farm products. I cannot assert that any better wheat, corn, oats, or hay, will be raised in 1900 than were raised in 1800, but there has been an almost phenomenal improvement in fruits and vegetables and in the minor products of the field, orchard and garden. In all those luscious and appetizing things that add so much to the enjoyment of the table and the general health of our people we excel by far all former generations.

IMPROVEMENT IN LIVE STOCK.—During the time of George Washington not a breed of horses, cattle, sheep or swine as they exist to-day, were within the borders of this country. There are now twelve breeds of horses, besides ponies, an equal number of breeds each of sheep and swine and, at least, twenty breeds of cattle. It was well after the century opened that a horse trotted a mile in the then phenomenal time of three minutes. Now a young man won't even do his courting with a horse that cannot go better than that, although this fact is surely difficult to understand, as I never heard of a young man in a hurry to get to the end of his destination at this interesting stage of his affairs.

Star Pointer 1:59¼, has a record of less than two minutes. 14,091 horses have made a trotting record of 2:30 or better. 5,200 horses have made a pacing record of 2:25 or better.

Cattle now make more and better beef in two and one-half years than they did in five years when in 1817 Shorthorns, Herefords and Devons were imported. There are now cows which will give in thirty days more milk than these cows gave in three hundred days.

The first permanent importation of Merino sheep was made in 1802 by our Minister to Spain. But our sheep of to-day are quite different from the sheep of yesterday. Statisticians tell us that as late as 1840 the average weight of a fleece in this country was less than two pounds and that now it is over six pounds; notwithstanding the fact that sheep have been domesticated for forty centuries. We owe Spain a debt of gratitude for the flocks of sheep we received from her shore between 1800 and 1810, through the enterprise of our diplomats, but we owe a still greater debt of gratitude to the American breeder for the improvement he has made in these sheep.

The railsplitter of the early days, which, when held up by the ears was expected to balance, has given way to the short-nosed, heavy jowled bundle of ham and lard of the present day.

IMPROVEMENTS IN DAIRYING.—The method of making butter at the beginning of the century was very little improved over the method employed by the Arab, when he carried his supply of milk in a goatskin upon a camel's back and thus discovered the art of butter making. Our grandmothers and even our mothers fed one-fourth of the butter of the milk to the calves and pigs, having obtained the residue by slow and laborious methods. Our sons are now taught to remove practically every particle of butter from the fresh milk and to do so with scarcely any labor at the rate of 2,500 pounds of milk per hour.

THE PLOW.—The American and European farmer of the eighteenth century understood the principle upon which the plow worked as little as did the Egyptian fellah in the days of Rameses II. Thomas Jefferson, after his return from his mission to France, first called the attention of the world to the fact that the plow consisted of two wedges. Charles Newbold of New Jersey, patented the first cast-iron plow in 1797 and after spending, as he alleges, $30,000 in trying to get it into use, abandoned the attempt, because the farmers declared the iron poisoned the soil and prevented the growth of crops. It was not until the close of the first quarter of the century that they came into general use in this country. In England it is said that Sir Robert Peel, as late as 1835, presented a farmer's club with two iron plows of the best construction. On his next visit he found the old plows with wooden mold boards again in use. "Sir," said a member, "we tried the iron and be all of one mind, that they make the weeds grow." They were quite right. Weeds always grow best on good soil.

SUGAR.—It was only a few years before the first permanent settlement in this country at Jamestown and Plymouth, that Queen Elizabeth sweetened her tea with honey. Sugar was too expensive a luxury for even the Queen of England. It is now one of the great commercial products of the world. Sugar has been changed from an expensive luxury to a common necessity in every household.

It was not until 1795 that sugar was manufactured from beets and not until thirty-five years later in France and forty years later in Germany that the manufacture of sugar from beets became a commercial enterprise. Half a century later more than half the sugar of the world was produced from beets. Beets, which half a century ago contained six per cent. of sugar have been so improved by selection that twelve to eighteen per cent. can be depended upon in commercial enterprises and is often exceeded in individual cases. While sugar was nowhere common as a food a hundred years after the discovery of America, now there is consumed over fifty pounds annually for each man, woman and child in this country.

HARVESTING HAY.—During the first quarter of this century the hay was cut with a scythe and raked by hand. The revolving hay rake was invented in 1824. Prior to 1831 no mower had been invented which contained the necessary elements of success. In 1890 we mowed over fifty million acres of grass. That hay harvest, probably, did not occupy the

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American farmer, on an average, over ten days ; so that five million acres were mown daily during the season throughout the United States. A man that would mow with a scythe and rake with a hand rake one acre of grass in one day would work much harder than the average farmer of to-day. To cut and gather into shocks the present hay crops of the United States according to the method in vogue when John Quincy Adams was President, would, therefore, for ten days each year require the services of one-third of all the men of military age in the United States. It would take twenty times our present army to get the hay ready to be hauled to mow or stack. Were it not for the mowing machine and hay rake, our soldiers would not be in Cuba, Porto Rico and the Phillipine Islands. They would have been required in the American hay fields.

The work that is now done with three horses, one man and a boy, sitting on mower and rake, only a generation ago required the severest toil of ten men and women in the boiling sun, while the housewife and her daughters had to prepare the food for ten instead of two. If the hay loader and the horse fork have not reduced the need of men, they have, at least, reduced the hard labor.

HARVESTING SMALL GRAIN—But the improvement in handling hay must yield the palm to the improvement in handling the small grains.

With our improved plows and pulverizers we prepare the soil not only much easier but much better. With our grain drills, we sow the seed not only much more evenly but also at a much more uniform depth. The method of harvesting wheat and barley in the year of our Declaration of Independence is pictured upon the tombs of ancient Egypt. By the beginning of the century the cradle had in America, but not in Europe, generally supplanted the sickle.

In 1831, a practical grain harvesting machine was built by Cyrus H. McCormick, of Virginia. It had the large drive wheel, the platform, the guards, the reciprocating knife, the divider and the reel of the present day machine. Manning of New Jersey and Hussey of Cincinnati, were in the field with similar machines at about the same time. In 1849 the Mann harvester was brought out, having a series of endless bands for carrying the grain to the side of the machine after it was cut.

In 1858 the Marsh harvester was used. The machine deposited the grain on the side but instead of being bound by automatic machinery, the sheaves were bound by two men alternately who were carried upon a platform upon the machine.

In 1873 the Locke wire binder marks the next step in the evolution of the binder, while the substitution of cord for wire the next year completes the essential features of our modern automatic cord grain binder. At the Centennial Exposition of 1876 it was one of the startling curiosities of that great show. By 1880 the binder had become an accomplished fact and an economic force but little realized then and but imperfectly understood now.

Do you realize that every bundle of wheat that was bound in the United States in 1870 had to be bound by hand ? Do you realize that if you subtract fifty years from that, every acre of grain had to be cut by hand ? Do you realize that if you subtract fifty years more, every straw that was harvested had to be cut with no better implement than the sickle ?

With the sickle a "bandwin" of seven men could cut, bind and shock two acres a day or two-sevenths of an acre each per day.

If the crop of 1898 had had to be harvested by the methods of our revolutionary fathers it would have required the services of every man of military age in the United States for at least three weeks. Even if harvested by the method employed when Andrew Jackson was President, it would take the entire population a week. To have harvested the small grain crop of 1898 according to the methods of our revolutionary fathers, every minister, every lawyer, every physician, every merchant, every manufacturer and every laborer in every city, between the ages of eighteen and forty-five would have been required in the harvest field. The vast populations which could not have existed, of Greater New York, Chicago, Philadelphia, Boston and every other city, village and hamlet must have been poured into the country. But how could they have been poured into the country ? Every railroad employe, from President to track hand, every engineer, conductor and brakeman would have been in the harvest field. During harvest time, as of old, all other work of the nation would have to be suspended.

It has been asserted, and I think, truthfully, that the issue of the civil war depended upon the invention of the reaper. No less an authority than the *Scientific American* asserts that close students of the political history of our country lay the preservation of the Union to the fact that the reaper allowed the gathering of the harvests and the progress and development of the northwest to proceed during the time of the great rebellion.

But this is not all.

Threshing eight to sixteen bushels of wheat per day per man with a flail was considered a good average. When the threshing machine was first introduced into Ohio in 1831, it was not only a great curiosity but it was stubbornly opposed by all farm laborers. "They claimed," says Bateman, "it as a right to thresh with a flail and regarded the introduction of machinery to effect the same object in a few days which would require their individual exertion during the whole winter, not only as an innovation of a time-honored custom, but as absolutely depriving them of the means of obtaining an honest livlihood. At a later date when a reaper had been introduced into a field of ripe wheat as a matter of experiment only, every one of the harvest hands deliberately marched out of the field and told the proprietor that he might secure his crop as best he could, that the threshing machine had deprived them of their regular winter work twenty years ago and now the reaper would deprive them of the pittance they otherwise could earn during harvest." How short sighted they were. No class has gained so much from the introcuction of labor-saving machines as did those who did the labor. The reason we are so much better off to-day, the reason we have the luxuries and comforts beyond the fondest dreams of former generations is due to the fact that the labor of each man has been made so much more effective through these labor-saving devices. The humblest citizen shares in this improvement. Not all share alike and not all share equitably, but each generation sees the race probably sharing more equitably than any generation which preceded it.

COTTON.—Next to an abundant food supply, the most important material need of mankind is clothing. The clothing of the ancients was made of wool and flax. In the United States there are now manufactured three pounds of cotton for every pound of wool, flax and silk combined. The culture of cotton became one of the world's industries upon the invention of the cotton gin by Eli Whitney three hundred years after the discovery of America. In 1784, eight bales of cotton, 4,000 pounds, were confiscated at Liverpool, on the ground that so much cotton could not have grown in America. Since 1890 the United States has raised in a single year over four, not thousand, not million, but billion pounds. The area devoted to cotton in the United States is exceeded only by corn, hay, wheat and oats. All other crops hold an insignificant place. The United States raises about one-half the cotton of the world, which is raised almost exclusively by colored labor. Our export of cotton exceeds in value the combined value of our export of wheat, flour and corn by over a billion dollars. Or, in other words, it is a third greater. It is asserted by the leading authority on cotton statistics, that "the cultivation of the cotton plant, the manufacture of its fibre, and the distribution of its products afford employment to a much larger amount of capital and labor than any other branch of mechanical industry."

Lord Macauley is reported as saying " What Peter the Great did to make Russia dominant Eli Whitney's invention of the cotton gin has more than equalled in its relation to the progress and power of the United States." Those of you who have read Grant's Memoirs will remember that he attributes the permanence and extension of slavery and the war between the States to the increase of the culture of cotton. "The cotton gin," says Grant, "probably had much to do with the justification of slavery."

What does this mean to you and to me. It means that but for the cotton gin many of us would have to dress in rags. We would suffer from the heat of summer through the lack of nothing but woolens, and from the cold of winter from the lack of enough woolens. It means, for example, that we would wear no underclothing. It means that we would not to-day be dressed in white shirts, collars and cuffs.

INDIAN CORN.—I have tried to sketch a few of the more striking aspects of our country's growth in agriculture. Time will permit me to mention but a few other points.

While the cultivation and harvesting of the corn plant has not been improved in a manner equal to that of our small grains, yet the importance of this great American cereal has only been realized in the last century. The world now raises about as much corn as wheat and at about one-half the cost, notwithstanding the great improvements in the culture of the latter. We raise in Indian corn the same food material on half the area and at half cost as compared with any other staple crop known to civilized countries before the discovery of America. This is a fact of the deepest significance.

The potato is another plant that the Western Hemisphere contributed to civilized nations. Two hundred bushels contain about four times the food value of fifteen bushels of wheat. The possibilities of soil have thus been increased. The potato has, therefore, thus far been a greater factor in the food supply of Europe than in America. Timothy and tobacco must, also, be reckoned among the minor plants of economic importance which the discovery of America contributed to the race.

What force or forces has brought about the wonderful changes about which volumes have been written and many more might be written.

The development of fresh fertile tracts; the adding of new food products to the world's dietary by which a pound of food could be produced by less labor; by tilling the old and new land; and the handling of the products by the invention of suitable tools made of wood, iron and steel, have been important factors. Through the application of machinery animal labor has lessened man's labor. But by far the most significant fact is that the use of iron has made it possible to harness coal, and its laboring daughters, oil and gas, to the world's work. What coal, oil, and gas and animals do man does not need to do.

It is a fact well understood by scientists that most all energy comes from the sun's rays, and that the usual method of applying that energy is through the carbon that the plants take out of the atmosphere under the influence of the sun's rays. It is the animal's only source of energy. Now the only difference between the carbon in the crop of 1898 and that of the coal in the mine or the oil or gas in the bowels of the earth is that the latter is older. It was not from the crop of 1898. It was from a former crop. The date has been lost. It was stored up awaiting the time when man should be developed to that stage of enlightenment when he could make proper use of this great and beneficent power.

"The dominion of peace, order and industry," says a prominent writer, "rests upon coal, iron and gunpowder." Recent events would seem to indicate that gunpowder is the least of them. Coal is king.

### IN CONCLUSION.

We have seen that were the crops of 1898 to be harvested as in the time of our Revolutionary fathers, every able-bodied man of military age in the United States would be required to gather them. The forces I have described, have made it possible for men and women to devote their lives to art, music and literature whose energies were formerly required to produce sufficient food and raiment for mankind. Growing two blades of grass where but one grew before has made it possible for men and women to spend the heated season performing in roof gardens of cities, or in suburban parks, whereas formerly the husband labored in the harvest field for some farmer at moderate wages, while the wife in the cabin hard by toiled to prepare a humble meal.

Why this wonderful development of railroads and other forms of rapid transit? The forces I have mentioned have made it possible for a portion of mankind to produce food and raiment while a portion distributes it and mankind at the same time.

What is causing the marvelous growth of our cities? In 1800 one person in twenty-five lived in cities in the United

States. Now about one person in three lives in towns of over 8,000 inhabitants. Why? Because they are no longer needed to till the soil. Forty per cent. of the population can raise food enough for everybody in this country and at the same time furnish three-fourths of our exports. Our fine public buildings, our twenty-story business blocks, our magnificent theatres and hotels, our palatial private residences are the results of these same forces.

Why has woman been brought to something like her proper sphere? Because she has time for self education. Why do our daughters fill the public school rooms? Because they are no longer needed at the spinning wheel. A well known public woman is reported to belong to thirty-two women's clubs. How do women find opportunity to devote their time to this work? Because men now make their raiments at one-hundredh part the cost for labor required a century ago.

Why have we made such rapid advances in science? It has been made possible for men to devote their lives to this work while other men in return furnish them with food, raiment and shelter. Every discovery thus made tends to lessen the burdens of mankind and thus pave the way for still greater achievements.

In no former war, it is said, has the percentage of deaths to wounded been so small as at the battle of Santiago. Not neglecting the Mauser bullet, itself the product of improved mechanics, it may be confidently asserted that it was principally due to the important discoveries in surgery and the application of our increased knowledge in the use of antiseptics. In like manner the scientist has been of untold benefit to the tillers of the soil. He has taught the farmer that his soil is not only a storehouse but a laboratory. The principles of plant growth and the action of plant food have been studied. The discovery of beds of phosphates and of potash by the chemist and the discovery of the action of bacteria in conserving and adding to the nitrogen of the soil by the bacteriologist has not only lengthened the ultimate period of life upon the globe, but has added directly to the prosperity of the farmer.

Modern guns manned by Spanish ignorance and superstition have gone to the bottom of the ocean. Nineteenth century guns cannot be successfully operated by fifteenth century tars. Modern guns require the highest education, training and skill of an American naval soldier. Modern farming requires altogether a different kind of education, training and skill than was required one hundred years ago to make it successful.

Brainy as well as brawny farmers have made American farming what it is. No considerable tract of land was ever subdued and cultivated by such an intelligent, energetic body of men as have tilled the farms of the United States for 250 years or more. Their intelligence and their energy was a prime factor in grasping and developing the forces that for untold centuries have awaited the hand of intelligent man, and their continued intelligence, skill and energy will ever be this country's safeguard in material, political and moral affairs.

When America was discovered the Indian population of the United States was about that of Cincinnati. It was all the population of that kind it would support. Under improved and improving agriculture in the hands of educated men and women it is destined to support many hundred millions of happy and prosperous people. It is destined to become in the hands of an educated, intelligent, energetic people, the most prosperous, the most powerful and the most humane nation upon the face of the globe.

## SOME NOTES UPON THE FOREST CONDITION OF OHIO.

BY JOHN F. CUNNINGHAM.

In considering the forest conditions of any State or region we have an immense subject. The information must be mostly of a statistical nature, and to generalize statistics is practically an impossibility. We can, however, look into the few general classes into which forestry at once divides itself and comment shortly upon them.

Having given a region that had been overswept by an immense cultivator and land manufacturer in the shape of a glacier, and thus being possessed of excellent facilities for plant growth and nourishment, we should expect a good growth of trees, since the conditions that are favorable to the growth of plants in general likewise affect the growth and thrift of forest trees. Such was the condition of Ohio in its early history, and such was the result.

Ohio was originally a forest country. The first white settlers who came to the State found it an immense forest, the whole State being heavily wooded, with the possible exception of a small area in the northwest corner. There were so many trees that they were in the way, and to make room for agriculture, "clearing" was begun. This clearing was a destructive operation, consisting of felling the trees and getting rid of them in any way possible, some of which methods were primitive and crude in the extreme. The practice of "clearing" seems to have engendered in the minds of the people of the State hatred of timber land, judging from the present apathy toward the forestry movement, which is attracting so much attention in other States, notably New York and Pennsylvania.

Beginning with what we might call unbroken forest, but which must be made to include the natural openings in the woods, we find that in 1853 the percentage for the State had fallen to 55.27 per cent. This is not at all unreasonable, since the country had become quite thickly settled by that time, and the land was needed for the cultivation of farm crops, and the wood was needed for lumber.

By 1870 we find that the timber lands had fallen to 38.51 per cent of the area of the entire State. By 1881 the area had fallen to 20.79 per cent, and by 1896, to 17.92 per cent. These are the facts as gathered from the reports of the assessors of the different Counties of the State for the years named. While not being absolutely accurate, we must allow that they are about as accurate as any figures we might be able to secure. Some authorities say that to preserve the balance of nature, which seems to exist, there should be at least 20 to 25 per cent of the land covered with woods—not merely trees, but regular woodland, underbrush and all. This may be true with some theories, but let us see how it is in some of the countries of Europe. Some years ago (about 1883), the area of timber in Germany was 25.1 per cent; in France, 17.3 per cent; Switzerland, 18 per cent; Holland and Belgium, less than 1 per cent, etc. At the present time the areas in these countries are less than those just stated, notwithstanding the fact that rigid forest management is practiced. Ohio, then, is not so very far wrong in the amount of her forest lands, as compared with the European countries just mentioned. Reference to the chart will show that in 1896 the timber area for the State was nearly 18 per cent of all the land. It seems to me, however, that the amount of woodland to be required will depend entirely upon the contour of the land. A level land would certainly not need the protection that should be possessed by a rugged, hilly country. Now Switzerland, with her 18 per cent, was much more in need of forests for protection than some of the more level countries with a much lower percentage.

Another point in regard to our Ohio forests, is that although the amount may be sufficient, the distribution is not exactly right for the best results. Theory and reason would tell us that to control the streams of the State, as forests can control them, the forests should be about the headwaters of the streams and their laterals.

That the regulating effect of forests upon the flow of streams is generally acknowledged, is shown by the following, (written by myself for the Columbus *Press-Post* of March 31, 1898,) and with which all with whom I talked agreed.

### HIGH WATERS.

The recent high waters certainly carry some significance other than the fact that they have come and gone and left waste and desolation in their path. That the waters of the rivers were never so high before is asserted by persons who are authority upon such matters about Columbus. But what seems to be the most prominent feature of the case is the fact that the waters rose in a few hours after the rains that caused them, and now, forty-eight hours after these rains have fallen, the high waters have come and gone. What does this sudden rise and subsidence in the waters mean? In the first place, as said before, it means great loss and waste of property, and perhaps life. In the second place, it shows, in a vivid and terrible way, the effect of the ruthless destruction of forests about the headwaters of the streams. What is there to hold these waters back? Little or nothing. A natural forest covering upon the land might well be compared to the turf upon a hillside or a sponge upon a slanting surface. When the rains come the turf (or the sponge), catches and holds large quantities of water and then allows it to slowly escape by flowing out into the streams, and evaporating into the atmosphere. The forests act upon the land in the same way, but upon a much larger scale. But now we have an instance of the hillside without the turf, the slanting surface without the sponge. The rains come and the unimpeded waters rush down over the hillsides into the streams, carrying off the fertile soil from the uplands and covering the farming land of the bottoms with gravel and rubbish. During the next summer these same parts that have been submerged this spring may expect a severe drouth. As the absence of forests has caused floods this spring, so it will cause drouth in times of needed rainfall."

The water shed through the north central portion of the State should also be well wooded. From the high waters in the spring, and the drouths in the summer time for the past few years we must admit that something is wrong. Is it not possible that it may be the extended clearing of woodlands where they influence the flow of streams? And if we could but regulate our water supply, would we not be repaid for our attention to the forests of the State?

Contrary to the belief of many, there is some reforestation going on in the State. I have noticed in Champaign, Licking and Perry Counties in particular, that there is quite a good growth of young forest trees, principally oak, hickory, and in some instances small groves of locust or rows of catalpa. I am informed that through the Western Reserve where much lumbering has been done in late years, that a great deal of the land is being allowed to grow up again with young forest trees. This is right. Let us look to future needs of timber and supply our own wood.

## THE NESTING SITES OF SOME OF OUR SMALLER BIRDS.

BY E. B. WILLIAMSON,

*Carnegie Museum, Pittsburg, Pennsylvania.*

The question of the economic value of our birds is being more carefully studied to-day than ever before. A subject neglected till recently, it has been most diligently assailed in this country for several years past, and the end is not yet. Indeed, with each new bit of data, the plot thickens. Our owls have been placed in the ranks of beneficiary species because of the meadow mice they destroy. Now, Mr. Rhoads wishes to know who gave the *mouse* its reputation for evil ways. The food habits of the nestlings, as well as of the adults of many species have been studied, but it is necssary to go farther back than this—we must know the habits and economic status of the food itself, perhaps even of *its* food, so the problem is a difficult one. The question of the economic value of this insect or that bird grows more and more difficult when its relation and bearing to other forms of life are studied. But for the present, speaking to the best of his knowledge, the student of economic ornithology will pronounce that bird which feeds upon the seeds of rapidly spreading weeds, or that bird which daily eats large numbers of foliage-destroying caterpillars, beneficial; and I think we can all agree with him. The Division of the Biological Survey of the Department of Agriculture at Washington has a collection of more than 30,000 bird stomachs. The deductions to be made from a detailed examination of these stomachs are sure to be of inestimable value to the agriculturist.

The preservation of each and every species of birds and mammals is perhaps not as necessary a thing as we have sometimes been told. With the increasing demands made of each acre of land by our growing population, it is impossible that the original balance should be retained. Indeed the balance is destroyed when man turns the first spade of earth. Native flora *must* give way to vegetation of more value, and this means that the faunas must change. Ohio has seen more than one species exterminated. Both herbivorous and carnivorous animals have disappeared. The wild turkey, prarie hen, passenger pigeon, the deer, the black bear and the otter are some of these. The removal of these species seems to have affected the remaining faunal life of the State but little if at all. The hawks and owls are sure to follow. More miserable than the Red Indian with no reservation to which they may retire, their doom is certain. But it is not so much upon the larger and more conspicuous species, as upon the smaller and more numerous forms of life, that an economic relation between agriculture and nature depends. The devastations by insects, in any one of the States in the Mississippi Valley, in any year doubtless amounts to the loss of more money than results from all the mischief wrought by "vermin" the United States over.

Let us examine together, now, the homes of some of our smaller feathered friends; look in, as it were, on the newly mated couples in their out of the way nesting places; and then consider what the preservation of this building site means to happy builders and to agriculture.

A morning's walk over the university farm in the latter part of May, if our eyes and our ears be awake and intelligent, will show us many secrets. Just at sunrise we creep through the barb wire fence, back of the slumbering, silent, old Big Dorm and turn our faces toward the Olentangy. The field back of the dormitory is a large one, closely pastured by the herd of cows belonging to the farm. No birds nest in this field, the grass is short and the ground beaten by the hoofs of the animals. But we hear the quail whistling and the meadow lark singing further on. Yes, there is a bit of waste ground near an old rail fence, and here the birds can nest in comparative safety. The clover field, nearer the river will not furnish a nesting site, because the mower would pass over the nest before the young had hatched. We cross the pasture and reach the rail fence, and a lithe red body and an elegant tail disappear between the rails. In the fence corner, a foot or so above the ground, a thrasher has placed her nest on the ends of the rails. The robin, too, loves such a situation, though we shall find him more commonly in the orchard among the apple trees; and the thrasher will be found oftener along the old river bed, in the jungles that abound there. A few old elms stand in the pasture fields near the fence. In and out among their dark leaves dash those bright bodies which so joyously bear the gorgeous colors of that old English Lord Baltimore over all eastern North America from Hudson Bay to Colombia. There are several nests in the tips of the long elm limbs. The young are just hatching now and the males are all excitement as they search for caterpillars and tell all comers their news at the same time. But the elms are worthless, one or two will afford shade enough for the herd, and the rest must go in order to increase the pasturage.

We jump over the fence and a song sparrow leaves the grass at our feet with a dash. This earliest and most joyful of all our spring songsters cannot endure cultivated fields for his home. Give him the bit of waste land, an overrun blackberry patch, or a sunny hillside with a few shrubs and some tufts of grass and he is happy. We are in a field of young corn now. A blasted, half-dead hickory stands just ahead of us, and a pair of red-headed woodpeckers are passing back and forth from the snag to the ground. They are carrying white grubbs and grasshoppers to their four young in the dead limb of the tree. Lower down in the same snag a pair of yellow-hammers have made their home. But the old hickory must go; it takes moisture that belongs to the corn and it's a nuisance in marking and planting.

Off to the right among the willows that skirt the stream which flows from Mirror Lake, we hear a mournful *wit-tit-che*, and a little brown body dashes up above the willows, seizes its insect prey, turns and drops out of sight. It is our little alder flycatcher, and with the disappearance of the willow thickets we shall have heard its plaintiff notes for the last time.

But the morning is passing, life in the open places has apparently ceased to be; the notes of birds come now only from the thickets; so let us seek the briary jungles and cat-tail marshes of the old river bed. In the wild grape tangle which covers a small elm is a shrike's nest, the five little shrikes, just from the nest, sitting about, each waiting for his hourly meal of white grubs. The shrike nests also in hedges and more rarely in orchard trees. The results of examinations recently made at Washington of eighty-eight stomachs of our loggerhead shrike show that it is a highly beneficial species, most of food consisting of grasshoppers.

In the more open woodland along the old river bed, the yellow billed cuckoo nests, usually in some elm bush. The kingbirds are nesting in the sycamore and oaks, and the jay moves about from one tree to another, refusing to give a hint of his resting place, though his uneasiness is greatest when a certain elm is approached. On the river's bank a downy wood-pecker has chipped a home in a small dead willow, and as we stand listening to the nearly grown young in the nest, a rough-winged swallow darts at the vertical bank just above the water and disappears in the tunnel, at the further end of which its nest has just been completed with a few straws and feathers.

Then we turn back from the river again into a dark, cool ravine and on an exposed horizontal limb we find the plastered nest of the wood thrush with the homely young waiting to be fed. And then we pass out of the ravine through the underbrush where the red-eyed vire is nesting, past the thicket which conceals the homes of catbirds, brown thrashers, cardinals and indigo birds, with here and there a summer yellow bird's nest in an elm bush; along the edge of the old river bed, lined with hackberry trees and oaks and sycamores, where the robins and turtle doves live, to the cat-tail swamps where a most uncordial hubbub greets the intruders. One year this small patch of cat-tails sheltered fourteen red-winged blackbird's nests, and the singing of the males and their beautiful forms enlivened the surrounding fields. Then across the open to where the Norway spruces teem with grackles, through the orchard under the robins' and turtle doves' nests, and out to the street, and then home to sum it all up.

We have visited twenty-four species of birds, every one, to the best of human knowledge, a friend and benefactor of mankind. Among them are represented the commoner species on most Ohio farms to-day. And how many of these species can withstand the cultivation of every square foot of soil, the doing away with the old brushy corners of rail fences, the strip of waste land on either side of hedges, the unoccupied land which margins swamps and ponds, and the unpastured, untrampled underbrush of thicket and ravine? In other words, how many species can endure modern scientific economic agriculture? Not ten of the twenty-four—the king bird, blue jay, crow, black bird, Baltimore oriole, robin and turtle dove and possibly one or two more.

But perhaps we attach too much importance to the nesting sites of these species aud to the effect which would result from a complete occupation of the land by agriculture. Let us look back over history's pages and see what birds have been extirpated within man's knowledge, by whom and how.

In the Mascarine Islands, the ancient home of the Dodo, a great many birds have become extinct. Among these are two other Didine birds, three species of parrots and a paroquet, two species of doves, a large coot, a rail and another closely related bird, a heron, a starling and an owl. Their extirpation is due solely to occupation of the country. Most of the extinct species are hardly represented by specimens in any museum, so that collectors have played no part in this destructive work. Many species formerly known among the Antilles have disappeared. The maccaws, formerly observed in Jamaica may be exterminated. Six species of parrots have disappeared from the French islands Guadeloupe and Martinique. New Zealand birds are suffering destruction from the great numbers of ferrets and weasels which were placed there to prey on the rabbits (themselves an introduced species), but which, once established, fed on the helpless members of the avifauna, many species of which build their nets on the ground. In the Sandwich Islands many species are extinct due to the destruction of the native flora, effected by the cultivation of the lowlands and the grazing of the hills. Ledru visited the West Indies in 1796. He enumerates fourteen kinds of birds as occurring on the islands of St. Thomas and St. Croix. Of these there is now no trace of eight of the number. " In all countries, and at all times it has been the habit of colonists to burn the woods surrounding their settlements—partly to clear the ground for further crops and partly (in tropical countries especially) to promote the salubrity of their stations. When fire was set to the forest and brush of a small island, the whole of which could be burned at once, the disastrous effect on its fauna can easily be conceived. Even the animals which happened to escape the conflagration itself would speedily starve, owing to the, at least, temporary destruction of the native flora, whence, either directly or indirectly, they derive their wonted sustenance."—A Dictionary of Birds, by Alfred Newton.

The great auk is a notable example of a bird which has recently become extinct. In 1780 fishermen and explorers landed on the islands where these flightless birds congregated to breed, and they drove them on planks and sails into their boats, " as many as shall lade her," to be salted down for food. And in 1844 the last two of the species ever seen alive were captured in Iceland. The species had passed from untold numbers to absolute extinction within one man's lifetime. Scarcely a hundred individuals are represented in all the collections of the world. The Labrador duck, a species almost as large as the Mallard, is also rapidly passing to extinction. The last two taken were sold for $200. The destruction of their nests by man has been the most important cause of their extinction. The largest known species of cormorant, living on Behring Island in the North Pacific, has become extinct within the century. Its value as a food bird resulted in its destruction. Only four skins and a few bones represent this fine species in the museums of the world.

So extirpation has been brought about by man in one or more of three ways: First—by direct attack. Under this head we may include the killing of the birds and the collecting of their eggs for food. Some of our most beautiful species have been brought to the point of extinction by plume hunters. Second—by the introduction of certain destructive pests. In an island free of predaceous mammals, where many of the birds nest on or near the ground, the introduction of such animale as skunks and ferrets, increasing in numbers with great rapidity, as they always do under such circumstances, is bound to result disastrously to the helpless birds. And before they can adapt themselves to the new conditions, many species will have become extinct. The domestic cat and English sparrow are exerting considerable influence upon any avifauna. And, third, and many times more important than the other two, is the destruction that comes by occupation of the land, by burning, clearing, grazing and all improved agricultural methods,—the reclaiming of waste land, and the care bestowed on timber, when every slightly decayed tree with its supply of insect food is removed as soon as discovered. For us the third of these causes is by far the most active, and the responsibility is with you, my horticultural friend. We have had bird laws and bird laws—and who have made these laws and worked for their enforcement? The bird-hunter and the collector, the sportsman and thc bird-lover. Three reasons have they always given for their zeal—protect the game birds that we may have sport, protect the beneficial species that we may have increased crops, and protect them all for their beauty and song and the third reason is as good as the other two. Let the horticulturist do his part toward preserving our birds. We *must* have the inspiration that comes to us in the song sparrow's early March symphony.

## THE KITCHEN GARDEN.

### BY PROFESSOR WILLIAM R. LAZENBY.

Garden vegetables grow surprisingly well in this country. On the whole, we have a soil and climate far surpassing those of England, Germany or France, and yet we are shamefully deficient in the variety and quality of our garden products.

One of the most striking characteristics of English country life, a characteristic that favorably distinguishes the common people of Great Britain from those of this country, is their love for gardening. The skill, taste and industry displayed in the management of a small allotment or the care expended upon the petty holding of land attached to the humble cottage; to the expert eye does not each kitchen garden, with its varied products, its culture and general condition, reveal much of the hand and mind of the cultivator? Here is promptness, there procrastination; here is evidences of hard work, but much of the labor is lost for lack of skill or knowledge. Here too much is attempted, and time and labor meet with scanty reward. On the whole, however, success rather than failure is the rule.

It is incredible to those who are unacquainted with the facts, how large a part of the family living comes out of these little gardens. The abundance and cheapness of land in this country explains in part, at least, why the family kitchen garden is too often sadly neglected. The desire to possess land is well nigh universal. Our broad, free acres have incited our vanity and caused us to think more of quantity than quality.

One may demonstrate with mathematical certainty that in a given case it is better to possess one acre than one hundred, but who prefers the one acre? It is contrary to the genius of our people. We want to do things on a large scale and have little attachment and less sympathy for small areas.

How can we overcome this neglect of the kitchen garden? As the good housewife is the one most deeply concerned let us look to her. She must smile her sweetest and plead her loudest until the head of the house is convinced that there is no work of greater importance to the material and spiritual well being of the home than a good garden. He must be brought to realize that it is a veritable fountain of health; a well-spring of comfort and convenience; a sort of oasis in the desert of rural and sub-urban life. It can be all this.

It goes without saying, that the prime requisite to any satisfaction in vegetable gardening is to have rich soil, well subdued, and thoroughly drained and aerated. The garden should be so layed out that the cultivation can be done with hand-wheel tools, or where the space will permit, with horse tools. The old-fashioned garden beds, bordered with sunken walks, are wasteful of time, labor and moisture. Have the rows straight, long and continuous. It is better to have several kinds of vegetables in one row, one following the other, than to have many short rows with one kind.

The following is a good general plan for a small kitchen garden: Let us suppose it is 300 feet long by 50 feet wide, the rows running the long way, which preferably is north and south. Commencing on the east side, allow five feet for asparagus, rhubarb and various garden herbs, such as sage, carraway, thyme, etc. Next should come five feet of parsnips, salsify, spinage, winter onions, etc. Then five feet of early peas, cucumbers, cabbage, cauliflower, etc., the early peas to be followed by late cabbage and celery. Then five feet of early potatoes, followed by turnips. Next, three feet for lettuce, carrots, beets, onions, radish, endive and parsley. Four feet for string beans and summer squash. Six feet for sweet corn—some early and some later. Five feet for tomatoes, lima beans, egg plant, etc. Six feet for muskmelon and water melon. Six feet for winter squash.

To sum up, the essentials of a good kitchen garden are:

1. A well managed hot-bed.
2. Soil so well prepared by tiling that you can work it at the earliest possible moment in spring.
3. Ground so laid out that the wheel hoe or horse implement can be used.
4. Plant all perennial crops and vegetables that remain out over winter, side by side, and where they will not interfere with the early plowing.
5. Arrange all vegetables very nearly in the order in which they should be planted or set out, commencing on one side with the earliest and continuing with those that come later.
6. Provide for an easy rotation of crops by placing early vegetables on one side one year and the other side the next.

# Columbus Horticultural Society.

QUARTERLY JOURNAL OF PROCEEDINGS.

VOL. XIV. COLUMBUS, OHIO, SEPTEMBER, 1899. No. 3.

## SEPTEMBER.

HORTICULTURAL HALL, O. S. U.,
September, 30, 1899.

The meeting was called to order at 2:35 P. M. by President Lazenby. Mr. F. K. Luke was appointed Secretary *pro tem.*

Under the head of "Summer Observations and Experiences of Members," Dr. Aldrich spoke of several new varieties of apples which he had on exhibition. The Mann apple is a western variety that has been grown for some ten or fifteen years but is a new apple here; the tree is a symmetrical grower. Pyle's Red, winter apple, bears rather young; the tree is not of good form; the fruit is of good quality and a good keeper. Shackford is productive, large in size, and quality said to be good.

Professor Lazenby said that he believed the Ohio conditions were more like those of the Mississippi valley than those of the Atlantic coast; hence we need to look to the West for our trees.

Professor Hunt spoke of his visit during the summer to California and promised to present to the Society at some future meeting some of his impressions of California horticulture. He said that the clean culture was the most surprising thing to him, and that he had traveled for a week overland and saw no grass or vegetation in the orchards. It is not as hot at San Francisco as it is one hundred miles further north.

Professor Lazenby spoke of Mr. Rollin Morrill's peach orchard, in Michigan, of forty acres from which the crop was sold for $35,000 this season.

Mr. Harry Ballou read a paper before the Society on "Cannas: The Varieties to Select and How to Grow Them." A discussion followed the reading of the paper.

Mr. Aldrich: "Can they be grown in pots and used for winter decorations?"

Mr. Ballou: "Take the dwarf kinds and place in a south window and keep at a temperature of 65 to 70 degrees and they will do very nicely."

Mr. Streeper exhibited a specimen of Alphonso Bouvier canna which was eight feet high.

Homer C. Price was elected to membership in the Society. A motion was passed instructing the President and Secretary to get an expression from the members of the Society in regard to changing the time of meeting from the last Saturday of the month to a more convenient time.

The resignation of Mr. Cunningham as Secretary of the Society was accepted, and a vote of thanks was passed in recognition of his faithful and efficient work. H. C. Price was elected to fill the vacancy. The Society adjourned.

## REPORT OF COMMITTEE ON ENTOMOLOGY.

### NOTES ON OHIO INSECTS INJURIOUS TO STORED VEGETABLE PRODUCTS.

Recent work by various entomologists, and especially by Chittenden, has made easy the identification of such insects as are covered by the title of this report.

With the assistance of students and others we have brought together a number of Ohio species of this kind, and as they concern the horticulturist in a measure, I trust it is not out of place to present notes regarding them before this society.

The Indian meal moth (*Plodia interpunctella*, Hbn.) is very troublesome in dried fruit, and I have occasionally seen it in corn meal and flour. The presence of this insect in houses is first made known oftentimes by the appearance of the adults which station themselves upon the ceilings or walls, until, upon being disturbed, they fly across the room to a new location. This form of the insect has an expanse of more than half an inch; the hind wings and basal two-fifths of fore wings are rather light greyish, the remainder of the fore wings brownish. The larvæ spin numerous webs and with them fasten together particles of the substance upon which they are feeding.

The confused flour beetle (*Tribolium confusum*, Duv.) is a brown insect, about one-sixth inch in length. Last January a two-pound box of rolled oats was brought into the laboratory and the statement made that it was badly infested by insects. Large numbers of both larvæ and adults of this species were procured. I know nothing of the history of the rolled oats except it was purchased at one of the groceries of the city.

On one occasion I found (*Prinus brunneus*, Duft.) in numbers in a flour barrel. I was unable to find the larvæ or the source from which the beetles came, but large numbers of both males and females were procured, and their presence in the flour caused a certain amount of annoyance, if not injury.

The following species of insects have been reared or collected in grain, flour, bran and the like:

The Angonnois grain moth (*Sitotroga cerealella*, Ol.). Reared from seed corn kept for a time in a building heated by furnace. This species is not likely to become injurious as far north as Columbus.

The meal worms (*Tenebrio molitor*, Linn.) and (*T. obscurus*, Linn.) are common. Their wirewonm-like larvæ are liable to be found in a great variety of places. Bran or flour that has been left unmolested for a long time is pretty sure to be infested by one or both of these species. In fact, any out-of-the-way place in granaries, mills, and the like, are favorable places for them.

The grain beetle (*Silvanus surinamensis*, Linn.) has been found in wheat bins, in packages of oat meal, and in a variety of places.

The foreign grain beetle (*Cathartus advena*, Waltl.) has been found injuring corn and wheat in the agricultural museum.

The Cadelle (*Tenebroides mauritanicus*, Linn.) is very common and does an immense injury at times.

The rice weevil (*Calandra oryza*, Linn.) often occurs in large numbers, and I have seen small quantities of wheat in museums so infested that nearly every grain contained one or more of the adult beetles.

Several other species have been observed and taken, but enough have been enumerated to give some idea of the number of Ohio insects that habitually obtain their food from stored vegetable products.

On a small scale, infested dried fruits and the like may be kept free from insect attacks by putting them into sealed receptacles. Insects are generally killed if infested material is placed in an oven and the heat raised to 150° F.

On a large scale, bisulphide of carbon may be used. This liquid is very volatile and its fumes must be confined in order that the desired effect be accomplished by it.

JAMES S. HINE, *Chairman of Committee.*

## REPORT OF COMMITTEE ON FRUITS.

### FRUITS AND CLIMATIC EFFECTS.

We have passed through a year of remarkable extremes of both heat and cold, having its effect on the production of fruit, berries, and on fruit-tree growth, and destruction.

The variations of temperature through the State of Ohio during the year 1899 were remarkable both as to heat and cold, and dry times early and late in the growing season of trees.

In the Northern part of the State, where we generally expect the colder extreme during February, the mercury ranged from 8 to 10 degrees below zero; in the Central part of Ohio it fell as low as 30 degrees; while in Hocking county and the counties south and east, and along the Ohio river it fell from 36 to 38 degrees below, and at one point in Athens county 40 degrees below zero was claimed. This extreme cold has not been known before in Ohio.

The peaches were not killed in the Northern part of the State, but in the Central and Southern portions not only were the peaches killed, but in many instances the trees.

The peach tree killing was not as great as was at first supposed, and was confined mostly to the old trees. In some instances orchardists topped their young orchards, supposing them killed; this was to their sorrow and loss, as others who did not do it found that most of their trees revived.

On examining my young peach orchard, March 1st to 4th, when cutting the wood of both the limbs and trees, I found it was very dark, and smelt as if the sap had soured. These conditions gave the impression to most persons that their trees were killed, but under the bark there was a softness and pulpy feeling to the touch, which seemed to be taking moisture, whether from the roots or air I could not determine.

At the time I made these observations the air was moist and warm and a warm rain followed. This pulpy material or inner bark became firm an began to turn green, when I was convinced that the sap was beginning to flow, and I felt my young orchard was not killed.

I must say I am very much gratified that I did not take the advice of a number of persons of greater experience who advised topping them, for I now have a thrifty young orchard.

Many trees were full of blossom, but the germ of the peach was mostly killed; all were not, however, for I noticed in Athens, Franklin and Hardin counties on some trees individual peaches. I hoped to have procured some of the pits from these, thinking that as they had withstood such degrees of cold, that a hardy variety might have been obtained by their propagation, but in each instance the peach was spirited away before maturing.

Our market was quite well supplied with peaches from the Northern part of Ohio, Michigan, and some from New Jersey and California.

This year we did not have any from the South, which was unusual.

The fruit tree growth during the year has not been as great as usual, owing to the periods of dry weather during the spring, summer and fall. I have specimens of the wood cut from young peach trees, I will place before you, that show the center to be dark and apparently dead.

The young trees have made some growth, as you will see from the white wood of the specimens. There have been many fruit buds set on the young trees, sufficient to give us an abundant crop of peaches next year, provided the conditions are favorable.

The apples were not apparently injured, excepting in some instances the large trees burst. We have had an abundant crop of apples. The hot and dry weather caused a premature ripening of the fruit, both of fall and winter varieties, and much of it fell before the ordinary time for picking.

Winter apples are not keeping well unless in cold storage.

Insects and fungus growth seemed to have thrived and certainly got in their work, as shown by the imperfect apples on the market. Where spraying was resorted to, the apples were mostly perfect, more abundant, and adhered more tenaciously to the trees. The users of the sprays were many times repaid for their trouble and expense, by the largely increased returns when selling, besides the self-satisfaction of having beautiful and perfect fruit. Our market has been well supplied with apples from our neighboring orchards.

Cherries, plums and pears did not appear to be hurt by the cold, but the quince trees were quite generally killed. These fruits are not produced in orchards in this vicinity, but by a few trees in almost everyone's garden.

I do not know of a commercial orchard of these fruits in the Central part of the State, with the exception of a plum orchard a few miles west of Columbus, owned by Mr. Rieble, and one owned by Mr. Wood, at Cardington, Delaware county. These orchards have proved successes; the one in Delaware county commenced bearing at five years. In 1898, when the orchard was seven years old, it was loaded with fruit. They are mostly Japan plums. These orchards proving a success, should be an inducement for planting many others.

Our market was reasonably well supplied this year with plums from New York and Michigan. This luscious fruit is becoming more popular from year to year. While these fine plums were on the market selling at $1.75 to $2.50 per bushel, the damson sold at 50 cents to 75 cents per bushel higher.

Cherries and pears of home production were not abundant. One of the regular attendants at our market, most every season has quite an abundance of very fine cherries. In reply to the question as to what he did to accomplish their production, he said, "I do nothing," He certainly must have some secret he intends keeping to himself.

Strawberries of home growth came into market the latter part of May, two to three weeks earlier than usual, and it was pleasing to see that they were in abundance from our local gardens, and always commanded a better price for corresponding size and quality than those that were brought from a distance. This should be an inducement for their being grown in greater quantities.

In this connection I must speak of the remarkable phenomena of the uniformity in the time of ripening of the strawberry throughout the Central and Southern States.

The extreme cold of February was correspondingly so in the South, killing the oranges in Florida, retarding, setting back, and killing of the berry growth in the Southern States.

The warm weather of April continuing through May gave us the unusual early season we have passed through, and from these climatic conditions we have had in our market the unusual sight of seeing, during the first week in May, 1899, something that may never occur agan, of seeing and having strawberries from North Carolina, Arkansas, East and West Tennessee, Georgia, Kentucky and Southern Ohio. One might have had in a saucer of strawberries, berries from each of these States at one time.

Raspberries and blackberries are not raised to any great extent in our local gardens, and we are mostly dependent upon neighboring producers for our supply. Both of these berries are natives and respond to cultivation, and it seems strange we do not produce them, for they certainly can be grown with a profit.

Formerly we had in our markets of home growth an abundant supply of currants, but of late years about all we have are brought from a distance. This has been occasioned by the enemies of the currants, but as these troubles are now under control, as shown by Mr. Anderson, of Galloway, who has during the past few years had quite an abundance. From his success it is to be hoped our gardeners will renew their efforts and raise them in sufficient quantities for our own market at least.

The gooseberry formerly was raised in quantities sufficient to supply our markets, but we are now dependent on others to a great extent.

Grapes were of rather a poor quality and small quantity. In consultation with our commission men, getting from them an account of the great quantities of fruit and berries that are brought into our markets, I am satisfied that not more than 20 to 25 per cent of our local consumption comes from our home production.

It does seem to me that this should be changed; that we should as a society try to reverse this condition, and at least try to have produced the 75 to 80 per cent. and not send away for more than the 20 per cent.

With a view of making a record of the facts, I want to speak of the heading of the wheat in Central Ohio as early as from the 6th to the 10th of May, and harvested the latter part of June.

Corn cutting began the latter part of August.

Onions were ripe in August, and all fully matured in early September, a month earlier than usual for both.

The dogwood was killed by the cold this year, which has not occurred before in the history of Ohio.

When the statement is made that the accumulated deficiency of the rainfall since January up to the present time is 9.67, nearly if not equal to one-fifth of the entire amount of our rain for a year, it can better be appreciated how dry a year it has been.

And how hot a spring and summer we have passed through, with the excessive cold of January and February, that there is now an accumulated excess of temperature of 370 degrees having had its effects on the crops of 1889, and will have more or less effect on those of 1900.

GEO. W. GILL, *Chairman of Committee.*

# THE EDITOR'S TABLE.

Mr. John F. Cunningham who has served so efficiently for eighteen months as editor of the Journal has accepted the position of assistant editor of the *Ohio Farmer.*

This number of the Journal has been delayed. The work being new to the Secretary, and there being but one meeting to report, it has taken him some time to procure the additional papers and reports that go to make up this issue. Hereafter we hope to publish the Journal on time.

Bulletin 24 of the Division of Forestry of the United States Department of Agriculture has just come to the Editor's Table. It is the first half of a primer of Forestry by Gifford Pinchot, and is what its name indicates. It is by far the most elaborate bulletin that has been published by the Division of Forestry. It is bound in cloth and consists of 88 pages of reading matter and contains 44 full page illustrations and over 80 smaller illustrations. It is a valuable book and one well worth sending for. The edition printed was not large and members should write for it at once.

With this issue a new secretary takes up the work of editing the Journal of the Columbus Horticultural Society. We can ask for no more success than has attended former secretaries, and it is with a feeling of uncertainty that we try to follow in the steps of such men as W. S. Devol, A. D. Selby, Clarence M. Weed, J. S. Hine and John F. Cunningham. For fourteen years the Society has published its Journals, and from a small volume of about seventy pages, made up in newspaper form, they have grown to be a volume of one hundred and fifty pages or more, that is sought not only from all parts of this country but from other countries. It is with a sense of responsibility that we make our editorial bow and ask for the hearty coöperation of the members of the Society to keep up the high standard that has been established by former secretaries.

It is with sorrow we record the death of one of the life members of this Society. Dr. Edward Orton died on October 16th of paralysis of the heart. It is a loss that will be felt not only by the city of Columbus and the State University, with which he had been connected since its founding, but by the country at large. As a scientist he had gained a national reputation, and as an evidence of the esteem in which he was held, he was last year elected President of the American Association for the Advancement of Science, and presided over their sessions last summer. In the death of Dr. Orton the Society has lost a faithful member and a staunch friend. In a later issue of the Journal a full sketch of his life and work will be presented by one of his associates.

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Bulletin 172 of the Cornell Experiment Station brings to the horticulturist the sad news that a new enemy to the cherry has been discovered in Massachusetts and New York. This new cherry pest is closely related to the apple maggot, and its work differs from that of the larva stage of the curculio in that the outward appearance of the fruit shows no evidence of the presence of the maggot. Fruit that when picked appears to be plumpest and best will be found to contain a maggot reveling in the rich juices of the fruit.

Fortunately the pest has only been reported from a few sections, and it is to be hoped it will not spread to any great extent. It is closely related to the European fruit flies, and no efficient remedial measures have been suggested.

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Every year some new enemy in the form of a weed, insect, or fungus arises to do battle with the horticulturist, and it has come to be truly a survival of the fittest. But to the thorough going and intelligent horticulturist the announcement of a new enemy does not bring terror. It simply means that it will require more work to overcome the new foe. It is the shiftless and negligent man that will be the sufferer and fall prey to the new enemies. It is a question whether the introduction of a new weed does not induce better agriculture or horticulture. The introduction of the San Jose scale, while it has wrought destruction in many places, has undoubtedly brought about a higher class of horticulturists. Orchardists have been on the alert, and while looking for the scale their attention has been attracted by other enemies that they had grown accustomed to, but had made no effort to check.

Professor Craig of Iowa said this summer, that he was not sure but what the freeze last winter, that destroyed so many of the orchards of the State, was on the whole a benefit to the horticulture of Iowa. The poorest fruit growers were the ones that suffered most, and would be the ones that would not replant their orchards, while the best fruit growers, the men that were in the business to stay, would not hesitate to replant their orchards, and in this way the competition of poor growers would be overcome. Very often what seems to be a great affliction turns out to be a blessing in disguise.

# GOOD THINGS FROM OUR EXCHANGES.

The fall is a good time to take a look around and see what great growths have been made, and many plants will be found to have encroached far beyond their own boundaries. Especially is this so around dwelling houses. Many are reluctant to cut back anything that has grown right under their eyes, as it looks like ill treatment of an old friend that has shaded and protected us from the hot sun and warm atmosphere. Yet the necessities of the season compel some action to let in the sun's rays at a time when they are beneficial in destroying germs that otherwise would be detrimental to our health and comfort. We can trim with all the more cheerfulness, assured that next season will replace all that is cut off and they will look all the more beautiful for a judicious trimming and pruning. If the place looks bare and there is room, some of the early spring flowering bulbs will be just the thing to gladden the heart and please the eye at a time when nature is beginning to put on her best.

*—Jas. Boyd, in the California Cultivator.*

It is the popular cry now to "be progressive," "get out of ruts," "experiment." Well, that is all well enough if the beginner is sure he can afford to defy the example of men of experience and of intelligence up to the average. Before he rushes into an untried field, let him count well the cost. His opportunities for mental quickening are great now. The agricultural press college and institute can be most helpful to him if he has sense enough to use the tools they place within his reach.

The beginner nowadays has experiments made for him at the State's expense. He will be wise to avail himself of the conclusions reached by abler than he. Too many dabsters in these days of institutes are prating about some half-baked experiments they have made, and young men with good purposes and ambitions to excel are misled rather than helped. The farmer of larger experience and more maturity is not so easily demoralized. Here again is a chance for the young enthusiast to take anew his bearings, and not rush off from his corn, into sorghum, alfalfa, rape, etc., because some enthusiast has been trying these and writing and talking them up to sell seed or get glory as a progressive farmer. The young farmer of today needs more than an average judgment and power of discrimination not to be led into ventures that will prove expensive rather than profitable.

*—L. N. Bonham, in the National Stockman and Farmer.*

## EVAPORATION OF DORMANT TREES.

The chief factor which defines the areas of the profitable growing of fruits and fruit trees, as is the case with all agricultural crops, is climate. The main factor of climate is temperature. The fruit growing area may be divided into climatal fruit-zones, bounded by the isotherms, or lines of equal temperature.

The second important factor of climate is moisture. The fruit growing area of the United States, may be divided into three zones by the isohyetals, or lines of equal rainfall, the Atlantic zone, bounded by the Mississippi river on the west, the plains zone, extending westward to the mountains, and the Pacific zone. The Atlantic zone is quite moist, while the plains and Pacific zones are comparatively dry. The plains zone, in which we live, is perhaps the most trying to fruit trees, on account of the hot, dry winds of summer and the cold, dry winds of winter, which cause excessive evaporation through the bark. Serious injury to trees is very liable to occur in winter, because evaporation goes on when the ground is so deeply frozen that the roots cannot supply any moisture.

The extent to which evaporation takes place through the bark of dormant trees may be determined by experiments. A series of such experiments have been commenced at the State farm, by Mr. Cutting and myself, only one of which has yet been completed. The experiment is as follows: On November 7, four twigs were cut from an apple tree in the orchard and brought to the laboratory. They were then shortened down to about a foot in length, the object of this second cutting being to leave as little time as possible between the cutting and weighing, The cut ends were then immediately dipped in melted paraffine to prevent evaporation, except through the bark and buds. The twigs were then weighed and put in a place as much exposed as the tree from which they were taken. They were weighed at frequent intervals for one week, and a record kept of the losses from time to time. They were as follows:

Twig No. 1: Original weight, 5.357; loss in 24 hours, 10 centigrams; in 54 hours, 17 centigrams; in 78 hours, 25 centigrams; and in one week, 43 centigrams. Twigs No. 2 and 3 showed similar results. These three twigs were all of the last year's growth. The average loss in these twigs was about eight per cent. of the original weight. Twig No. 4 was cut from a branch three years old. Its loss was only very slightly less than that of the other twigs in proportion to the bark surface exposed, but this slight difference was probably due, in part at least, to the greater number of buds in the twigs of the new growth, through which evaporation would take place. From these results it may be interesting to calculate how much moisture a tree loses in winter. The apple tree from which we took these twigs is twelve years old and six inches in diameter through the trunk. It exposes about 120 square feet of surface, and evaporates about 13.5 grains of moisture per day, which is a little more than one gill. This may then explain why it is that some trees are injured during very dry winters. It is a known fact that trees which cannot endure our climate thrive farther east, where the temperature may be the same, but where the climate is more moist. Therefore, the more dry the climate, the more susceptible are trees to injury. The time that there is most danger from this source is during several days of continued freezing weather, when no moisture can be supplied from the roots to take the place of that lost by evaporation.

It has been noticed frequently that during very cold weather in winter the twigs seem somewhat duller than usual, and sometimes tend to become shriveled in appearance. After a few days of thawing weather, they resume their normal appearance again. This is no doubt due to the fact that during a thaw the equilibrium between the sap in the tree and that taken in by the roots is maintained, so that as fast as moisture is evaporated from the twigs and branches sap flows up from the roots and re-establishes the equilibrium.

It has been thought that the rate of evaporation from trees in winter determines the relative hardiness of different varieties of apples and some other fruits. But experiments, made at the Cornell experiment station, with several varieties of apples of different degrees of hardiness, show that no such relation exists between the per cent. of loss of moisture and the hardiness of the varieties.

Studies have also been made at Cornell to show that the tenderness of some trees in dry winter climates may have been due to such an anatomical structure of the bark as cannot resist evaporation, and that hardiness is sometimes simply due to a thickness or denseness of the bark. The experiments seem to prove this to be true in some cases, but the investigations have not been carried far enough to give any definite results.

—*The Minnesota Horticulturist.*

## MEETING OF THE AMERICAN FORESTRY ASSOCIATION.

The American Forestry Association held a special meeting on August 22d and 23d, under the auspices of the Columbus Horticultural Society. The sessions were held in Horticultural Hall, Ohio State University. Professor Lazenby called the meeting to order, and on behalf of the Horticultural Society welcomed the Association to Columbus.

Among those present were: Dr. W. J. Beal, Professor of Botany and Forestry in the Michigan Agricultural College; Dr. C. E. Bessey, Professor of Botany in the University of Nebraska; Rev. James Poindexter, President of the Ohio State Forestry Bureau; C. S. Mason, Professor of Horticulture and Forestry in Berea College, Kentucky; William Saunders, Director of the Canadian Experimental Farms; Dr. B. B. Halstead of the New Jersey Experiment Station; Prof. A. D. Hopkins of the West Virginia Experiment Station; Prof. J. A. Holmes, Vice-president for North Carolina; Prof. L. C. Corbett of the University of West Virginia; Prof. F. W. Rane of the New Hampshire Agricultural and Mechanical College; Prof. N. L. Britton, Superintendent of the Botanical Gardens, New York City; J. F. Cowell, Superintendent of Parks, Buffalo, N. Y. There was also a good number of the members of the Society present to welcome their guests.

Telegrams and letters of regret were read from Gifford Pinchot, Forester of the U. S. Department of Agriculture; Dr. C. A. Schenck, Forester to the Biltmore Estate, North Carolina; W. W. Ashe, Consulting Forester, Raleigh, N. C.; Prof. John Craig, Iowa Agricultural College, Ames, Iowa; George W. Minier, Austin, Ill., and others.

Professor Lazenby in his opening address spoke of the rapid and reckless destruction of the forests of Ohio, and in speaking of the average annual rainfall he said: "We do know that our soil rapidly loses its summer moisture; that our springs and wells are failing, and our streams and rivers are more capricious in their flow; droughts are more severe and floods are more common."

After the appointment of a Committee on Resolutions and hearing verbal reports from the members representing different States, a formal address was delivered by Rev. James Poindexter, President of the Ohio Forestry Bureau, on the past and future work of that department. John F. Cunningham also read a paper on "Observations upon the Woodlands of Ohio."

During the morning session of the second day the following papers were presented and read:

"Natural Regeneration of Forests on Old Fields in Eastern Kentucky," by Professor C. S. Mason.

"Lumbering in Northern Michigan," by Dr. W. J. Beal.

"The Rate of Growth and Temperature of Various Varieties of Forest Trees," by Professor William R. Lazenby.

"Capitalistic Review of Conservative Lumbering," by Dr. C. A. Schenck.

During the afternoon a number of short excursions were taken to view some of the large and unique specimens of native trees bordering the Olentangy river.

# COMMUNICATIONS AND DISCUSSIONS.

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## CANNAS.—THE VARIETIES TO SELECT AND HOW TO GROW THEM.

BY HARRY BALLOU.

(Read at September Meeting.)

The Canna or Indian Shot as it is sometimes called, is now one of our most popular bedding plants. It is truly remarkable how rapidly it has sprung into prominence. This is due to the fact that within the past fifteen years a new section of dwarf bushy growing ones with large showy flowers has been introduced. Before this time they were all of the tall growing sorts with small flowers, and were grown for the beauty of their foliage, which is very ornamental. They produce a most striking effect whether planted singly or in groups on the lawn. A single tuber of some of them will grow ten feet high in one season and make a clump two or three feet in diameter if planted in rich mellow soil and watered freely.

In 1884 Mr. Crozy introduced the French section with their large flowers and fine foliage. This new section comprises a great many varieties, some of them are quite dwarf, others of them are tall and massive. All of them are crowned with spikes of brilliant flowers well above the foliage. The foliage is either green, bronze or red. The flowers are of various colors; crimson, scarlet, red, yellow, orange, salmon, pink, almost white, some of them are blotched and marked with another color making a very beautiful effect. As bedders they surpass all other plants leaving geraniums and others far in the rear.

The canna is propagated by seeds or by root divisions. They do not come true from seed and a great range of variety is had by growing seedlings. The seed may be sown early in the Spring or possibly to good advantage in the Fall in the open ground. They do not germinate very readily. Many plants were found coming up this summer in our grounds where the canna dropped their seeds last year. If sown later in the spring the seed should be either soaked in luke-warm water or filled through the shell. If a green-house is available, sow directly in the bench, keep well watered and very warm. This season we sowed a few pounds of seed in the green-house about the first of June, the plants kept coming up irregularly all summer; at intervals of about two weeks we lifted and potted them up, and there were as many plants to be potted the fifteenth of

September as at any other time. The soil was then thrown out and many seed were found that had not started, and were apparently as sound as when sown. The plants after potting were placed in a shaded part of the house and kept wet until they had started again, and were then put out in the open ground. Some of the first planted bloomed in August.

To start them from roots divide the tubers and pot them up and keep them in a warm place, give them but little water until they have started, then water freely. In commercial establishments the tubers are placed on two inches of sand in the greenhouse bench and covered with two or three inches more. After they have started they are potted up; if any piece starts from more than one eye they are divided and potted singly. By following this method all pots contain but one plant. But when potted before starting some have two or more and others none.

After danger of frost is past and the ground warmed up, they should be bedded out, nothing is gained by planting too soon. Better encourage the growth of the plants in the pots by giving them plenty of water and an occasional watering of liquid manure. Prepare the ground for them by spading in deep a liberal quantity of well rotted manure, rake fine and mark off rows fifteen or eighteen inches apart, according to variety. After planting keep the ground well stirred, give plenty of water during the season. After the roots have filled the soil discontinue cultivating and mulch with coarse stable manure. The best effect in bedding cannas is produced by massing them. If the surroundings will permit a bed of ten or fifteen feet in diameter planted in circles with a distinct color in each one, or of mixed colors with the tallest growing kinds in the center, it makes a beautiful show, or a screen may be formed by planting the tallest ones in a row and some of the dwarfer kinds in front, and thus hide from view some unsightly object and add to the beauty of the surroundings.

The clumps should be lifted late in the fall after they have been frosted and the tops become quite dry. If a green-house can be used place them under the benches just as they are and keep them dry. Give a temperature of 50° or 60° where greenhouse facilities can not be had; the clumps should be stored in a dry basement, kept free from frost and not warmer than 65°. An occasional look at them is necessary in as much as some of them may rot. The rotted ones should immediately be taken out and the remaining ones placed over.

There are a great many varieties of cannas on the market and every specialist is offering a dozen or more new ones each year. It is therefore very difficult for an inexperienced grower to select varieties. It is best to stay by some of the older varieties of the Italia or Orchid flowering sorts.

*Allemannia.*—Green foliage, flowers large and of a little better substance than any of the others of its class. Color, orange, scarlet. This is unquestionably the best of the Italia type. Italia is still the best of its class.

*Burbank.*—Yellow with red spots in its throat. The best of its color. Of the Crozy type.

*Alphonso Bouvier.*—Still the best of the tall growing crimsons and will be a standard for some years to come, its drooping flower-spikes are not without grace.

*Chas. Henderson.*—A good red. Blooms rather late.

*Black Beauty.*—Dark bronze foliage, almost black. Leaves are the most striking of its class.

*Egandale.*—The king of all the bronze leaf sorts, very free flowering. Flowers bright cherry red.

*Eldorado.*—Yellow with green foliage. An early and constant bloomer.

*Pres. Cleveland and Chicago.*—Stands at the head of their color, orange red.

Of the gilt edge sorts *Mad. Crozy*, *Antvine Crozy*, *Sam Trelease*, *Queen Charlotte* are the cream of the list. Add to this *Florence Vaughan*, spotted yellow, *Paul Marquant*, salmon and *Leonard Vaughan*, bronze leaf with orange salmon flower, and you will have some of the very choicest ones.

## THE PASSING OF THE RUSSIAN THISTLE.

**Read before the Association for the Promotion of Agricultural Science, at its meeting in Columbus, Ohio, August 18, 1899, by Charles E. Bessey, Chancellor of University of Nebraska.**

A decade or more ago, the people of the West were frightened because of the appearance of a new weed, which they called the Russian thistle, in their "breakings" and fields with partly occupied surface. For some years the experiment stations issued bulletins which were filled with more or less sensational matter descriptive of the structure, habits and probable future history of this new comer. State legislatures were besought to pass stringent laws to prevent its spread, and severe penalties were imposed upon certain officers for failure to exterminate the dreaded pests. When the tide of fear ran highest, Congress was besought to appropriate huge sums of money for the purpose of fighting this plant which was thought to be menacing the prosperity of the nation. It was a curious, but unfortunately not a solitary case of panic, a sort of epidemic which swept over the middle west, with sporadic cases outside of the region of serious outbreak. If instead of writing of the Russian thistle in this paper, I were discussing this epidemic of fear, I should propose the name "Salsolophobia" as a fit term for it, and should offer it as a contribution to that curious department of human inquiry in which attention is given to the delusions, hallucinations, crazes, manias, and other emotional epidemics which from time to time take possession of communities.

But I am not particularly interested in this phase of the Russian thistle, but have been much interested in watching this plant as it has come into the plant communities of the Central Plains. On its first appearance it occupied the "breakings" where the farmer had broken up the tough sod, and hard ground, and allowed it to lie idle for a year or so until the grass roots had rotted sufficiently to enable him to begin cultivation. Here the Russian thistle grew upon the virgin soil with no competition with other plants, and small wonder that the results were astonishing. The farmer finding a new kind of plant on his "breakings,"—round topped, stiff and very prickly,—was naturally somewhat troubled in mind, and this perturbation quickly passed into alarm when he found these sinister plants unfastening themselves and rolling like things possessed of evil spirits across the plains. And when the strong winds of autumn began to bring these uncanny tumble weeds in great numbers from other breakings far to windward—alarm passed into panic and the farmer's hands fell down in helpless terror, and his voice went up in entreaty to the legislative halls for a law to lay this evil thing and banish it from the land. I wish I could say that the doctors and teachers—duly appointed by governing boards to be the official investigators of the plants which pester the people, tried to allay the excitement of the panic stricken communities. It was, however, as it always has been; those who should have led the people away from their fears into quieter and saner moods, were swept along by the excitement, and became themselves contributors to the frenzy. Bulletins appeared in rapid succession from the learned doctors in the experiment stations, articles were published in the agricultural press written by still more learned teachers, all setting forth in more or less startling style every structural detail with half-tone reproductions of the terrible wonder, Salsola, in various stages, ages and attitudes, from the black snake-like weed, to the wild mannered but innately evil seedling, and full grown, grisly, prickly, rolling, tumbling thing of the autumn and winter. As Aaron himself, in the old story, went with the idolatrous people, as lawyers, teachers, and ministers went with the frenzied people during the witchcraft craze, so in this case, those who should have helped the people to a calmer view were too often themselves the leaders in propagating the excitement.

The people themselves began to realize that they were frightened unduly, and as they passed into a calmer mood, they rid themselves of the "Blue Laws" for which they had clamored in their fear. To-day as one travels over the Nebraska plains he finds the Salsola as a common wayside weed, small, slender and generally unnoticed. On the farms it is common, but of so little importance as neither to demand or receive especial attention. Now and then a plant may be found which comes up to the dimensions of the "half-tone" illustrations of the bulletins, but these are rare, so rare that one has to search long for a good specimen fully as long as when on its first appearance the largest and most formidable specimens were sought out as fit subjects for photographing.

In a recent journey of nearly a thousand miles in Nebraska, including a broad belt of counties from those touching the Missouri River on the east, to the Wyoming line on the west, I found that everywhere the Russian thistle is of relatively much less importance than formerly. It is a weed, no doubt of that, but it is one that finds little opportunity for troublesome growth on ordinary farms. On fallow ground it still grows large, and assumes a spherical form, but ordinarily it is low and slender. Many farmers and ranchmen esteem it highly as a fodder plant when fed early, and many cut it early and make it into nutritious hay. The day may yet come when the sheep growers of the plains will take pains to grow the Russian thistle as a fodder plant.

# THE DEVELOPMENT OF THE BUDS IN SOME OF OUR COMMON ORCHARD FRUITS.

BY WILLIAM R. LAZENBY.

Buds have been defined as "the germs of stems." They contain embryo axes with undeveloped appendages. Structurally buds are of three kinds, viz. : (1) *Leaf buds*, or those devoted wholly to the vegetative functions of the plant, and whose parts or some of them develop leaves. (2) *Flower buds*, which consist wholly of unexpanded blossoms. (3) *Mixed buds*, or those which contain both undeveloped foliage and blossoms.

Figuratively speaking, the leaf bud devotes its whole attention to the temporal and physical development of the individual plant, while the flower bud looks to the future and devotes its attention to life beyond the individual, life which may be manifested through untold generations.

The object of the flower is to produce seed. A seed is an undeveloped plant produced by the agency of the sexes. A leaf-bud may be regarded as an undeveloped plant produced asexually, or without the agency of the sexes.

The seed propagates the species. The leaf-bud propagates the individual.

It is this individuality of leaf-buds that is the cardinal point about which turn many of the most important horticultural operations. In fact every form of propagation except by seed.

For some years past I have been making observations upon the development of the buds on our more common fruit plants, and in this paper I present a simple record of some of these observations.

The common orchard and garden fruits may be grouped according to their flower-bud development into two classes : (1) Those which bear fruit from buds formed the previous year. (2) Those which bear fruit from buds formed the same year.

Each of these classes may be divided according to the position of the flower bud, into two sub-divisions, which may be termed: (1) Lateral-bearing. (2) terminal-bearing.

The lateral-bearing fruit plants of the first division are the peach, nectarine, almond and apricot. These do not develop fruit spurs. The terminal-bearing fruit plants or those which produce spurs are the apple, plum and pear. The lateral-bearing fruit plants of the second division, those which bear fruit from buds formed the same year, are the grape, blackberry and raspberry.

The only common terminal-bearing fruit plant of this class, cultivated in our latitute, is the quince.

Let us now briefly present some of the observed points in the development of the buds in the different groups of fruit plants just named.

*Peaches.*—These are devoid of spurs, the bud being borne directly on the shoot or branch. If we examine the lower part of the shoot of the present year's growth, we shall find that the buds sometimes appear singly, sometimes in twos, and often in threes, there being no definite number. On the upper part of the stem or shoot there is usually but one bud in a place, and these are often, perhaps usually, flower buds. In the climate of Central Ohio these flower buds rarely live through the winter, and if they do live and expand rarely produce fruit. Sometimes all the buds at one node may be flower-buds, or there may be two flower buds with a leaf-bud between, or where there are two buds one may be a flower and the other a leaf-bud.

Although three buds at a node is not uncommon, I have never found more than one of them to expand into a leaf in any healthy peach growth. Unlike the general rule, the most vigorous peach buds are not at the distal end of the shoot, but on the part first formed, or the lower half. It often happens that some of the peach buds will begin to grow the same season they are formed, and this growth is not confined to the point alone, but is seen at the base as well.

The flower buds of the peach are quite prominent from about February 1st in the vicinity of Columbus, and are often one-eighth of an inch long, with a nearly equal diameter.

One who has not carefully observed the buds of peach trees would not be conscious of the differences between buds of different varieties.

A close observer, however, can readily determine varieties by the buds alone. But this requires a degree of familiarity with the peach of which few can boast.

It is interesting to note that certain individual trees, and even certain varieties have a marked tendency to produce about the same number of flower buds each year, and that these flower buds bear a definite proportion to the number of leaf-buds. Careful estimates, including several distinct varieties, showed that the number of leaf-buds was from 35 to 46 per cent. of the total number of buds. The average, 39 per cent. shows that the number of leaf-buds is considerably less than the number of flower buds.

It should be remembered, however, that in a short time after blooming there are many more leaves than there were flower-buds, because a blossom bud produces but one flower, while a leaf-bud may produce one or more leaves.

*The Apricot.*—The fruit of the apricot tree is usually borne on spurs formed the previous season. The spurs are numerous and mark the position of a flower-bud the year before the spur started.

In late summer and early fall all the buds on shoots of the present season's growth are flower-buds which expand the following spring.

In the fall and early winter small buds begin to be seen by the side of these flower-buds, and in the spring they develop quite rapidly. This is the beginning of the spur.

On the lower part of the shoot two flower-buds usually occur in a place, and in such cases no leaf-bud forms. Sometimes three buds start from the same point, all of which are flower-buds.

Whenever two or more flower-buds are found together, it is seldom that more than one ever expands into a blossom. The others drop off. In the apricot as in the peach only one blossom is found in a bud, while in the plum, pear, apple and cherry there may be two or more.

*The Apple.*—Although the apple is the "world renowned fruit of temperate zones," and more generally grown than any other tree fruit, very little has ever been published concerning the growth and development of its buds.

During the growing season it is not easy to distinguish between the leaf and flower-buds of the apple. At this time neither position, shape, size, color, or any other characteristic is well marked.

Later in the season, however, some differences appear. As a rule all rapid-growing shoots of the apple bear only leaf-buds. The flower-buds are almost invariably borne on the extremities of spurs or short twigs. These terminal buds change each year. That is, they are alternately leaf and flower-buds, elongating the spur or twig one year, and producing fruit the next.

By this alternation of wood producing and fruit-bearing years, one can determine with considerable accuracy how much fruit any particular tree, or any branch of a tree, has produced during a series of years.

Whenever an apple has matured there is an enlargement of the stem. This is also quite pronounced in the pear. By carefully noting the size of the enlarged spur, and the scars at the end, one can tell with a fair degree of confidence whether the fruit reached maturity and the number there were in each individual cluster

The terminal buds of the apple are considerably larger than the lateral, and are more globular in shape.

The flower-buds are but little larger than the leaf-buds, but they are more regular in shape and usually a trifle longer.

*The Plum.*—The two classes of buds of the plum are quite similar in shape and appearance.

The flower-buds are usually a trifle the larger, and more oval, while the leaf-buds are slightly smaller and a little more conical.

The buds are borne, as a rule, on spurs from one to several inches long, and on one spur there may be from two to twenty buds.

Nearly always there is a leaf bud on each spur as a terminal, but occasionally the spur terminates in a flower-bud. Spurs occur on wood one year or more old, and are seldom found on the last year's growth. The leaf and flower-buds on the previous season's growth are readily distinguished. The flower-buds are on the lower portion of the shoot and stand out at an angle of about thirty degrees from the stem. The leaf-buds on the upper portion are more closely appressed to the stem and are somewhat narrower and more pointed.

In some varieties of the plum, as Coe's Golden Drop, buds occur three in a place on the proximate half of the last year's growth and all of these are flower-buds. The middle bud usually contains three flowers and the side buds two. The distal half of the stem bears one bud in a place and this is usually a leaf-bud.

*The Pear.*—The so-called blossom buds of the pear are not strictly or exclusively flower-buds. Each one contains a cluster of flowers, but it also contains in addition, the embryos of five or six leaves which develop and form a whorl around the flower cluster. Until the time of blossoming these leaves are scarcely perceptible, and the buds bear the general characteristics of all flower-buds in a marked degree. No one could fail to note the difference in size and shape between these terminal mixed buds and the lateral leaf-buds.

The number of flowers in a terminal bud varies from six to nine, and this together with the unusual size make these buds very interesting objects of study any time during the winter.

As early as November first, a microscopical examination will reveal the little nodules in which may be seen the minute pistils and stamens. The leaf-buds of the pear are somewhat uniform in shape, but their size is variable for different varieties. The matured fruit of certain varieties are no more distinct than are the buds of these varieties.

Perhaps there is a more constant difference in the buds than is ever seen in the fruit. Probably the Bartlett and Kieffer present the extremes in bud variation. The flower-buds of the former are of medium size, short and thick, with a blunt or rounded apex. As a rule each bud contains nine flowers, and the scales are thickly lined with bronze-colored hair.

The flower-buds of the Kieffer are large, long and pointed. Each bud contains eight flowers, and the scales are lined with a short pubesence. The outside of the scales have a faint, red blush.

*The Cherry*—Belongs to that class of fruit which produce buds one year and flowers the following.

The buds are borne either on spurs or branches. Some varieties produce all their buds directly on the branches and have no spurs.

Each flower-bud has from two to five bloosoms. There are often from three to eight flower-buds on a spur, with a leaf-bud as a terminal.

The flower- buds of the *grape*, *blackberry* and *raspberry* originate the same year the fruit is borne and from lateral buds. That is, all fruit buds are borne on wood of the present season's growth and unless growth takes place no fruit can be expected.

In the grape all the flower-buds are opposite the first few leaves, and when a tendril takes the place of a flower cluster there will be no more blossoms no matter how long the shoot may grow.

*The Quince*—Produces its fruit on terminals of the present season's growth, and when the flowers appear the growth of the shoot is at an end.

Later in the season leaf-buds appear which give rise to new shoots the following year.

The observations made show beyond doubt that leaf-buds change to flower-buds and that flower-buds may change to leaf-buds during almost any period of the growing season.

Florists hasten or increase the blooming of plants by limiting the root development. The fruit-grower may do the same by root pruning, and it has been repeatedly shown that trees which have been making vigorous growth and developing few fruit-buds may be forced into greater productiveness by this process.

The formation of flower-buds appears to depend upon a somewhat rapid development of food material with a lessened growth or multiplication of new cells.

Summer pruning, drouth, the cutting or removal of the bark, the bending of a branch, these and other agencies tend to produce this result.

It is only by observation and careful experiment that the fruit culturist can tell which operation can be practiced with the most satisfaction and profit.

## THE VITALITY OF SEEDS TWENTY YEARS IN THE SOIL.

**Read before the Association for the Promotion of Agricultural Science, at its meeting in Columbus, Ohio, August 19, 1899, by W. J. Beal, of Michigan Agricultural College.**

In the summer of 1879, I buried seeds as follows: Twenty lots, fifty seeds in each, of twenty-two species of plants, mostly weeds. Each lot of seeds, with one exception, was well mixed with damp sand dug up from three feet below the surface and placed in an eight-ounce bottle. The seeds were well mixed in the sand, the bottle left uncorked and placed with the mouth standing downwards, buried twenty inches below the surface of the ground in a sandy knoll. The acorns were not placed in bottles. At the end of five years, at the end of ten years, at the end of fifteen years, and now at the end of twenty years, sets of these seeds were tested for vitality and the results given at meetings of this society. In all cases, the results have been indefinite and far from satisfactory. I mean by this, that I have never felt certain that I had caused all of the sound seeds to germinate. I moisten the sand containing the seeds and forthwith a goodly number germinate and then they come slowly straggling along. I dry the soil and wait a few days, and after moistening in a few days, more seeds germinate. In two of the former tests, I dug the sand in spring or early summer and kept it about till the next November, removing the growing specimens from time to time; then the dry sand was set away till the next spring, when it was brought again and moistened. A nice lot of seeds germinate. Why was I unable to induce them to start, when treated to various degrees of temperature and moisture for seven months?

We see this important point; it is to the advantage of the plants not to shoot up all of their seeds at one time, but to retain a good portion alive in the soil to be ready for stocking the earth in successive years.

Again, we must consider that it makes very little difference whether all the seeds live over for a time or only a small proportion of these that were produced, as a living seed now and then left is enough to save the starts and produce new crops of seeds.

These were the seeds buried:

| | Germinated. |
|---|---|
| *Agrostemma githago*, L. (Corn Cockle) | 0 |
| *Amaranthus retroflexus*, L. (Pigweed) | 4 |
| *Ambrosia artemisiæfolia*, L. (Ragweed) | 0 |

| | |
|---|---|
| *Anthemis cotula*, L. (Mayweed) | 0 |
| *Brassica nigra*, L., Koch, (Black Mustard) | 9 |
| *Bromas secalinas*, L. (Cheat or Chess) | 0 |
| *Bursa bursa-pastoris*, L., Britton, (Shepherd's Purse) | 21 |
| *Echamæraphis glauca*, L., Kuntze, (Pigeon Grass) | 0 |
| *Erechtites hieracifolia*, L. Raf (Fireweed) | 0 |
| *Euphorbia maculata*, L. (Spotted Spurge) | 0 |
| *Lapidium virginicum*, L. (Wild Peppergrass) | 29 |
| *Malva rotundifolia*, L. (Mallow) | |
| *Onagra biennis*, L. Scop, (Evening Primrose) | 14 |
| *Plantago major*, L. (Broad-leaved Plantain) | 0 |
| *Polygonum hydropiper*, L. (Smartweed) | 1 |
| *Portulace oleracea*, L. (Purselane) | |
| *Imercus rubra* | 0 |
| *Rumex crispis*, L. (Narrow-leaved Dock) | 8 |
| *Stellaria media Cyr.* (Chickweed) | 3 |
| *Thuja occidentalis*, L. (Arbor vitæ) | 0 |
| *Trifolium repens*, L. (White Clover) | |
| *Verbascum thapsus*, L. (Mullen) | 16 |

I began to test these seeds on the 4th of July and continued to the 16th of August. I expect to record many more in this list. The figures here given for germinating seeds are still far from incomplete.

On investigations of the fifth year, I found the acorns all dead and decayed. In all the tests made, no seeds of the common cockle have germinated, nor the common chero, nor the fire weed, nor the arbor vitæ.

## A COMPARISON OF SOME VARIETIES OF PLUMS.

BY W. J. GREEN.

In the following comparison of varieties reference is frequently made to the groups to which they belong. This is done as a matter of convenience as well as to show, in a general way, what qualities predominate in the different groups. To the practical plum grower it may not matter how plums are classified, and it is not deemed necessary in this paper to take up the subject in detail, but a little explanation will help to a better presentation of the case.

The best known group is the common garden plum, *Prunus domestica*, often called the European plum, of which no description is necessary. Our native plums are nearly as familiar to most people, although so many new varieties have been originated within a few years, that one can hardly keep an index of them. They are divided into several classes, but it is necessary to mention only the most prominent, as all will not be referred to in this connection. *Prunus americana* comprises one group, of which it is sufficient to say that the trees are vigorous, with dark leathery foliage, while the fruit has a tough skin and is often astringent at the stone. The Wild Goose group, *Prunus hortulana*, has a foliage resembling the peach, somewhat, and the fruit is usually watery. The Wayland and Miner groups are really sub-groups of the above. The Wayland varieties have a bright, shiny foliage, resembling the Osage orange, and the fruit is very firm. The Miner group partakes of the characters of *americana* and *hortulana*. The Chickasaw, or *angustifolia* group, has foliage somewhat like the peach, and fruit watery, but the twigs are zigzag in outline, and the trees usually very spreading in habit. The *triflora* group comprises the Japanese sorts, quite distinct in most respects from the varieties of the other groups.

The plan of the following comparison is to bring together varieties having similar qualities, or characteristics, rather than to give detailed descriptions, thus enabling anyone to select for earliness, hardiness, quality, etc. This method serves to bring out some of the most striking characteristics of both varieties and groups.

PERIOD OE RIPENING. The earliest ripening varieties are Willard, Red June, Ogon and Kerr, all of which are Japanese sorts. The first named is small and of very poor quality, but the others are fairly good. Red June is by far the best of all. The Wild Goose group is represented by Wild Goose and Milton, which mature along with Red June, Ogon and Kerr. Clyman is the earliest of the *domestica* group, although there are several others nearly as early, and comes in with those above named. Thus it appears that the Japanese group stands at the head as regards earliness, and some others might be added that are almost as early. Late varieties are found in all groups, but the very latest that will ripen in this State are mostly of the Wayland group, and Wayland, Reed, Golden Beauty and Moreman may be named. Some of the best late varieties of the *domestica* group are Grand Duke, Monarch, Reine Claude, Arch Duke, Coe's Golden Drop. Nearly all of the varieties of the Wild Goose and Chickasaw groups are intermediate in time of ripening.

SIZE OF FRUIT. The *domestica* group easily takes the lead here, although it does not include all of the large varieties. Lincoln, Bradshaw, Prince of Wales, Grand Duke, Yellow Egg, Coe's Golden Drop, Pond's Seedling, Arch Duke and Monarch may be named as some of the largest and best European varieties. When well grown all of those named would be ranked as "fancy" by the trade. Of the Japanese varieties, Burbank, Chabot and Satsuma take nearly equal rank as to size as those in the above list, but most of the others fall a little below. Nearly all of the native sorts fall below what would be called "fancy," although some would rank as large, notably Wild Goose, Milton, Poole's Pride, Hawkeye, Ironclad, Forest Rose and Champion. The majority would be classed as medium, and some as small.

BEAUTY OF FRUIT. The honors are pretty equally divided here, provided we put all the natives into one class, but if we follow the same plan as before it must be conceded that the *americana* group will suffer in comparison, as most varieties of this class are rather dull in color. This is due, in most cases, to abundance of bloom. Some of the choicest in quality are decidedly unattractive in appearance. In the Miner group the case is similar, but in the Wild Goose, Wayland and Chickasaw groups are found some of the brightest colored fruits that are known among plums. Reed, Golden Beauty, Wayland, Choptank, Pool's Pride and Newman are good examples. Of the Japanese varieties Burbank, Abundance, Red June and Ogon are among the most attractive. In the *domestica* group there is a lack of bright colors and yet there are some very beautiful fruits. As in the case of the *americana* the bloom sometimes makes the fruit unattractive, particularly with the yellow varieties, but in many other cases it adds greatly to the beauty of the fruit, provided it is left undisturbed. Lincoln, Bradshaw, Fellenberg, Pond's Seedling, Grand Duke, Yellow Egg, Arch Duke, are all attractive in appearance and the list might be extended.

QUALITY OF FRUIT. In delicacy of flavor the *americana* group easily stands at the head. It is true that the skin and stone of some of the varieties of this class have more or less astringency, but for eating raw this does not come out as in cooking. Not all have this objection, however. American Eagle, Champion, Hawkeye, Ironclad, Purple Yosemite, Wolf and Yellow Sweet are all good and many others are quite their equal. Of the Miner group the best are Miner and Prairie Flower, the latter being particularly choice in quality. There are but few really good varieties so far as quality is concerned in the Wild Goose, Wayland and Chickasaw groups. Golden Beauty, Reed, Wayland and some others of the Wayland group are fairly good when fully ripe, and the same is true of Milton, Pool's Pride and a number of others of the Wild Goose group. The Japanese varieties stands but little, if any higher. Abundance is really good, and some would class Burbank and Chabot as nearly its equal, but they are hardly entitled to rank as best. There are many choice varieties among the *domestica* so far as mere sweetness is concerned, but delicacy of flavor is rather rare. They are more meaty than those of most other classes which, combined with sweetness, seems to give them richness, but the majority are evidently lacking in the rare quality of some of the *americana.* Imperial Gage, Green Gage, Missouri Green Gage, Reine Claude de Bavay, Fellenberg, Jefferson, McLaughlin, Coe's Golden Drop and Spaulding are all of excellent quality, and because of sweetness and substance they are commonly ranked very high, nor is there any reason to rate them differently.

Prolificacy and Precocity of Trees. Nearly all of the native and Japanese varieties bear young and abundantly; in fact are too prolific and precocious for their own good. The Burbank is a marvel in this particular, and it may almost be said that there is nothing else equal to it, but some of the Wild Goose group are not far behind. One may expect considerable crops from many of these varieties in two to three years from planting. Quite the reverse is true of most of the *domesticas.* Even the Lombard is behind those named in point of time and quantity. Most varieties of this class require from four to six years to reach bearing age.

Susceptibility to Attacks of Diseases and Insects. Here again we are able to make some clear-cut distinctions between groups.

The majority of the *domesticas* and Japanese sorts are very subject to fruit rot, while most of the natives are nearly exempt. Of the Japanese kinds Burbank, Satsuma and Abundance are particularly bad; so much so that it requires considerable skill to get any fruit at all from the first and second in unfavorable seasons. Of the *domesticas* Lombard, Gueii, Yellow Egg and Pond's Seedling are nearly as bad. It may be said of these two groups that to rot is the rule, and the exceptions are rare. On the other hand, the native sorts are often afflicted by the disease known as plum pockets and are subject to a twig blight not found upon the *domesticas.* Black knot is almost unknown among the native varieties, as well as the Japanese, but is very common with the European kinds. The shot hole fungus is found mostly upon the *domestica* varieties, where it often does much harm. The curculio attacks the varieties of all classes, but does most harm upon those of the *domestica* group.

Hardiness. Unquestionably the *americana* is the hardiest group of all, but there need be no fear in this respect regarding any of the native sort. The Japanese sorts will not endure our severest winters, nor will very many of the European varieties. Moore's Arctic is decidedly hardier than most others, and the Yellow Egg is regarded as comparatively hardy. The Japanese sorts bloom very early and are often killed by frost in the spring, hence are not safe in many localities.

As a sort of summary of the above it will not be out of place to name certain varieties that are adapted to particular purposes.

The following is a good market list, keeping in mind, however, the fact that varieties vary more or less according to soil and treatment, and that markets are not alike as to requirements.:

Bradshaw, Lombard, Lincoln, Prince of Wales, Gueii, Reine Claude de Bavay, Grand Duke, Fellenberg, Yellow Egg, Abundance, Burbank, Chabot, Red June, Wild Goose, Pool's Pride, Prairie Flower.

The list is, of course, too long, but one need not go much outside of it to get the best for this State.

For home use, the following are among the choicest: Reine Claude de Bavay, Fellenberg, Imperial Gage, Yellow Egg, Abundance, Red June, Prairie Flower, Richland, Reed, Hawkeye, American Eagle, Champion.

Yellow Egg, Prairie Flower, Fellenberg and Richland are particularly recommended for canning, and the Reed for jelly, as for this purpose it is unsurpassed.

As a final summing up it may be said that the *domestica* group has more good market varieties than most others, except for localities where it does not succeed. The Japanese group is pressing hard for a place and some of the varieties are likely to become good market sorts in many localities. Our native classes are full of good kinds, but for this latitude not many of them have just the qualities of market varieties, although some are destined to fill important places. It would not be wise to plant them exclusively, nor even largely, but they ought to have a representation. This class has a special place, planted a tree or two of a kind for home use, particularly for eating raw.

In selecting varieties of plums one ought, especially for home use, choose for particular qualities, and the list is so large that this is easily and satisfactorily done. For market one must select according to the demand as well as to have in view which varieties are likely to succeed.

Plum culture is advancing rapidly and new varieties are coming forward in quick succession, and much that is said today will need revision tomorrow, hence I do not stand committed for any length of time to any statements herein made.

## THE RELATION OF HONEY BEES TO PRACTICAL HORTICULTURE.

BY WILLIAM R. LAZENBY.

To what extent the pollination of the blossoms of our more common cultivated fruits is dependent upon the honey bee is a question of practical interest to every horticulturist.

During each spring for several years past, a series of observations bearing on this question have been made by the Horticultural Department of the Ohio State University, and the results of these observations may be briefly summarized as follows:

The apricot, which is frequently planted in sheltered positions having a warm exposure, is usually the first fruit tree to blossom in Central Ohio, and honey bees have occasionally been seen working quite freely upon these trees as early as April 1st. Some years, however, it is as late as April 20th before the blossoms appear. Closely following the apricot are some of our early blooming plums, and where different varieties of this fruit are grown, the period of blossoming is quite extended. For example, during the past season in our University garden, plum trees were visited by honey bees from April 16th until May 10th, inclusive, a period of twenty-five days. The Japanese plums being the first, and some of the European varieties the latest in blooming. This length of period is only possible where several distinct varieties or groups of plums are grown. For any one variety or group, the season is much shorter. The pollen collecting and honey gathering period is rarely more than five or six days for an individual tree. If two or three days of this time are cloudy, rainy or windy, the chances of pollination are lessened.

Pears and peaches soon follow the apricots and the earliest plums, and these in turn are closely followed by the cherries, the early sweet being first, and the early sour a little later. Apples come into bloom last among our common tree fruits, but their period of blooming as a class, is somewhat longer than that of the peach, plum or cherry.

Arranging the fruits grown in this latitude according to the date of blossoming, beginning with the earliest, the sequence would be apricots, plums, sweet cherries, sour cherries, pears, peaches and apples.

Arranging them according to the frequency of the visitation of the honey bees, the sequence would be plums, cherries, apples, peaches and pears, and this is based upon the collection of pollen rather then honey. In the way of honey production I would place apples first, then cherries, plums, peaches and pears.

The following tabulations show the activity of bees at certain periods, the comparative number collecting pollen and honey, the approximate number of flowers visited, the weights of bees and the weights of the loads of honey and pollen that were carried at certain dates:

TABLE I.—*Number of bees leaving and returning to hive at different intervals, and number collecting pollen and honey, May 3rd, 1899—plum and cherry trees in height of bloom.*

| TIME. | Number of Hive. | Outgoing workers | | Returning workers. | | | |
|---|---|---|---|---|---|---|---|
| | | Number leaving in 30 minutes. | Number per minute. | Number returned in 30 minutes. | Number per minute. | Loaded with pollen. | Loaded with honey. |
| 8:30 to 9:00 A. M.... | 1 | 1050 | 35.0 | 900 | 30.0 | 640 | 260 |
| | 2 | 1206 | 40.2 | 930 | 31.0 | 626 | 304 |
| 11:30 to 12:00 M.... | 1 | 1200 | 40.0 | 1248 | 41.6 | 240 | 1008 |
| | 2 | 1452 | 48.4 | 1542 | 51.4 | 178 | 1354 |
| 2:30 to 3:00 P. M.... | 1 | 2340 | 78.0 | 2424 | 80.8 | 75 | 2349 |
| | 2 | 2530 | 84.3 | 2862 | 95.4 | 57 | 2805 |
| *May 7th, apple trees in full bloom.* | | | | | | | |
| 8:30 to 9:00 A. M.... | 1 | 696 | 23.2 | 702 | 23.4 | 164 | 538 |
| | 2 | 1140 | 38.0 | 825 | 27.5 | 606 | 219 |

It should be noted that in no instance were the bees counted as pollen-laden unless an appreciable amount of pollen could be seen in the pollen baskets.

Careful and repeated observations made on different days and different hours of the day have clearly shown that when the weather is pleasant, and bees numerous, a very large percent of the blossoms of some of our fruit plants are visited by one or more bees. In every case coming under my own observation, I found plums and cherries visited the most frequently of the tree fruits. Although peaches have a very showy and apparently attractive flower, and the pear blossom a marked odor, bees do not visit them in anything like the number that they do the plum and cherry. Apples are visited more freely than pears and peaches, but not so freely as plums or cherries.

Bees do not appear to be attracted by the flowers of the common garden currant, but with the gooseberry they seem a little more familiar. Raspberries and blackberries are visited freely, especially the red raspberry. During a single favorable hour I have seen nearly every blossom on an average sized stool of a Turner raspberry visited or touched by bees.

Strawberries are infrequently visited by bees. Upon several occasions I have carefully observed good-sized strawberry plantations when in bloom, and can count upon my fingers the bees I have actually seen in contact with the flowers. They are often seen flying over the strawberry plants, appearing to have been attracted by the early and rather showy flowers, but they rarely light upon them, at least on our own grounds.

During the height of the strawberry bloom I have seen dozens of bees upon the flowers of the weeds that were among the strawberry plants, but seldom one on the flowers of the strawberry.

If I were to mark the different common fruit-plants on a scale of ten, showing the comparative number of flowers of each visited by honey bees, as observed on our own grounds and under essentially the same conditions, the grading would be as follows:

Red raspberry, 9.5.
Blackberry, 9.
Plum, 9.
Cherry, 8.5.
Blackcap raspberry, 8.
Apple, 6.
Gooseberry, 4.5.
Peach, 3.5.
Pear, 3.
Currant, 2.
Strawberry, 1.

On the morning of May 17th, between the hours of 8:30 and 9:30, sixteen bees were caught singly as they came from the hive and were immediately killed by means of a cyanide bottle. Each bee was weighed separately, and the results are given in the following table:

TABLE II.—*Giving weights of outgoing bees.*

| No. | Grams. | No. | Grams. |
|---|---|---|---|
| 1 | .092 | 9 | .083 |
| 2 | .071 | 10 | .071 |
| 3 | .075 | 11 | .075 |
| 4 | .075 | 12 | .075 |
| 5 | .078 | 13 | .073 |
| 6 | .083 | 14 | .081 |
| 7 | .078 | 15 | .087 |
| 8 | .091 | 16 | .081 |

Total weight...... 1.267 grams. Average weight...... .079 grams.

It will be seen that the lightest bee weighed .071 of a gram, and the heaviest .092 of a gram, the difference between the extremes being .021 of a gram. The average of the sixteen weighed is .079 of a gram, or 1.219 grains. According to this average it would require in round unmbers 5,750 bees to weigh a pound. A prosperous colony of 30,000 workers would weigh at this rate about five and one-fifth pounds.

On the morning of May 19th, between the hours of 8:30 and 9:00 sixteen bees were caught singly as they entered the hive. None were taken except those that bore every evidence of being honey collectors. These bees were immediately killed and weighed separately as before. The results are shown in the following table:

TABLE III.—*Giving weights of honey collecting bees.*

| No. | Grams. | No. | Grams. |
|---|---|---|---|
| 1 | .122 | 9 | .073 |
| 2 | .083 | 10 | .086 |
| 3 | .116 | 11 | .081 |
| 4 | .085 | 12 | .122 |
| 5 | .105 | 13 | .086 |
| 6 | .100 | 14 | .096 |
| 7 | .082 | 15 | .082 |
| 8 | .114 | 16 | .078 |

Total weight...... 1.511 grams. Average weight .094 grams.

It is shown by the table that the honey-loads of bees are quite variable, and it is probable that their efficiency as honey-collectors is like the efficiency of men as money-makers, some accumulating great stores while others, apparently as industrious, have little or nothing to show for their labor.

If we take the average weight of the out-going bee, .079 of a gram and deduct this from the heaviest honey-laden bee, the weight of which is .122 of a gram, we have a difference of .043 of a gram. This means that a bee that is an energetic and capable honey-collector, returns to the hive considerably more than one-half heavier than when it begins its collecting trip.

Deducting the average weight of the out-going bee, .079 of a gram, from the average weight of the in-coming honey-laden bee, .094 of a gram, leaves .022 of a gram as the normal or average weight of the honey load. This is 27 per cent. of the average weight of a bee, or a little more than one-fourth of its own weight.

On May 26th, between the hours of 8:30 and 9:00 A. M., twelve pollen-laden bees were taken just as they were entering the hive. Their individual weights were as follows:

TABLE IV.—*Giving weights of pollen laden bees.*

| No. | Grams. | No. | Grams. |
|---|---|---|---|
| 1 | .091 | 7 | .080 |
| 2 | .091 | 8 | .092 |
| 3 | .077 | 9 | .091 |
| 4 | .081 | 10 | .080 |
| 5 | .098 | 11 | .081 |
| 6 | .075 | 12 | .079 |

Total weight........1.019 grams.  Average weight.... .085 grams.

Taking the average weight of the out-going bee which we found to be .079 of a gram, and deducting this from the pollen laden bee, we have .006 of a gram as the average weight of a load of pollen. This is about 7.5 per cent. of the average weight of the bee.

Taking the average weight from the weight of the heaviest laden bee and we find that the pollen weighs something over 16 per cent. of the weight of the normal bee. In other words, a bee may carry about one-sixth of its weight of pollen although the average load is certainly much less.

The statement is frequently made that bees collect honey and pollen at the same time. My observations lead me to believe that this is not the case. I have killed scores of pollen bearing bees just as they were entering the hive and have never found one loaded with more honey than one is likely to find in any worker bee when it leaves the hive. The bee acts upon the maxim that "a little provender hinders no man," and almost invariably takes a lunch, or carries a small supply of food when starting out on a collecting trip. Although the pollen-gatherers, as we have seen, do the light carrying work of the hive, I am firmly convinced that they are of equal if not of greater service in the work of pollination than the honey gatherers.

Painstaking counting under many different circumstances show that for the same time, and speaking with reference to our common fruit plants, the pollen gatherer visits from three to five times as many flowers in a given time as the honey-collector.

The observations I have briefly recorded, while not important in themselves, may stimulate others to investigations of equal interest and profit to apiarians and horticulturists.

Columbus Horticultural Society.

QUARTERLY JOURNAL OF PROCEEDINGS.

**VOL. XIV. COLUMBUS, OHIO, DECEMBER, 1899. No. 4.**

# PROCEEDINGS OF THE SOCIETY

## OCTOBER.

Horticultural Hall, O. S. U.,
October 28, 1899.

The meeting was called to order at 2:20 P. M. by President Lazenby. The afternoon was very rainy and the attendance was good considering the weather.

The Secretary reported that the replies he had received from the return postal cards sent out asking members if the meetings of the Society could be held at a time that would be more convenient for them, than the present time of meeting, were about equally divided between those, who wanted the meetings changed, and those to whom the present time of meeting was as convenient as any other. No action was taken and the consideration of the change was postponed till the annual meeting in December.

Professor J. Warren Smith was elected to membership in the Society.

Professor Lazenby spoke of the unusual number of flowers in bloom at this time, the dandelion and violets being quite common.

Mr. Hine reported a small beetle, a species of Phylacrus that he had found feeding on smuts of grains.

Professor Smith said that the theory had been advanced that the damage done by freezing to orchards of the west was due rather to the freezing after heavy rains in November than to the severe cold of February, the injury being done to the roots rather than the tops.

Professor Lazenby said that nurserymen were much more afraid of the winter killing of trees that root near the surface, after a dry fall than after a wet one.

J. C. Britton spoke of the horticulture of Minnesota and the northwest. He said that insects and diseases are not as prevalent as in Ohio nor is spraying as general.

The regular program was then taken up, which was as follows:

"Fruits: Some of the Climatic Effects of 1899,". Geo. W. Gill.
"Pear Culture and Report on Season's Crop,"........................................................H. Warren Phelps.
"Plums at the Ohio Experiment Station,"... Prof. W. J. Green.
"Apple Crop of 1899,".......................L. K. Sutton.

A communication was read from Mr. Wm. Miller of Gypsum, giving a report on this season's peach crop.

Professor Lazenby spoke briefly of some of the structural features of the apple, and Mr. Streeper gave a brief talk on pruning grape vines, illustrating his method from specimens he brought before the Society. Adjourned.

## NOVEMBER.

November, 25, 1899.

The meeting was called to order by President Lazenby at 2:10 on Saturday afternoon, November 25, in the Horticultural Hall, of the Ohio State University.

Reports of committees were called for, and Professor Osborn reported for the Entomology Committee that the Hessian fly was doing great damage to the wheat in the Ohio Valley, and that the late sown wheat was being damaged more than wheat sown at the usual time, a very unusual occurrence, probably due to a second brood of the fly that have survived, owing to the warm, dry fall that we have experienced.

The Secretary exhibited a very fine specimen of *Gloire de Lorraine* begonia that he had received from R. and J. Farquhar of Boston, Mass. Eleven different varieties of chrysanthemums were exhibited, showing the different types and forms of flowers sought by florists. In the absence of Albert Knopf, who was to have spoken on chrysanthemums, President Lazenby spoke at some length on their development and classification. The regular program was then taken up, which consisted of:

"Trees for Shade and Ornament,".............W. R. Lazenby.
"Floral Notes,"..............................F. K. Luke.

In the discussion that followed the reading of the papers, the question was asked by Professor Hunt why so few buckeye trees were planted for shade in the Buckeye State. President Lazenby thought it was due to the introduction of the horse chestnut, which is a showier tree and has been planted instead, but he thought it was a mistake not to plant it more largely. The meeting adjourned.

## DECEMBER.

HORTICULTURAL HALL, O. S. U.,
December 30, 1899,

The meeting was called to order at 2:30 P. M. by President Lazenby.

Reports were called for from the Standing Committees and any matters of news from the members.

Professor Kellerman reported that the red fruited dandelion (*Taraxacum erythospermum*) had been found this fall upon the University campus, and that it blossoms much later in the fall than the common dandelion, which it resembles very closely.

The program of the meeting consisted of an address by Professor Thos. F. Hunt on the "Horticulture of California."

The reports of the Secretary and Treasurer were read and accepted.

Mr. S. C. Comeans was elected a member of the Society.

President Lazenby stated that a communication had been received from Professor Selby, offering his manuscript of the "Flora of Franklin County," upon which a large amount of work had been spent in preparing an annotated catalogue of all the plants of Franklin County, to the Society for publication. After considerable discussion the following motion was passed: "In view of the fact that the finances of the Society are such that its annual income is only sufficient to meet current expenses, the Society deems it best to defer the matter for the present."

The election of officers for the ensuing year was held with the following result:

### OFFICERS.

| | |
|---|---|
| *President* | W. R. Lazenby. |
| *Vice President* | T. A. Scott. |
| *Secretary* | Homer C. Price. |
| *Treasurer* | Geo. W. Sinks. |

### EXECUTIVE COMMITTEE.

O. W. Aldrich, Herbert Osborn, J. J. Janney.

It was moved and carried that the election of Chairmen of the Standing Committees be held at the January meeting.

It was moved that the next meeting be held in the city at the call of the President.

## IN MEMORIAM.

Edward Orton was born in Deposit, New York, March 9th, 1829, and died in Columbus, Ohio, October 16th, 1899. He was the son of Rev. Samuel Gibbs Orton, who for a half century was an active and successful Presbyterian minister of central and western New York. The most of his youth was spent at Ripley, New York, and he was fitted for college under the tuition of his father and by study in the academies of Westfield and Fredonia.

He entered the sophomore class of Hamilton College in 1845, and graduated with very high standing in 1848. The year 1848-49 he assisted in an academy at Erie, Pa., and during 1849-50 he was a student in Lane Theological Seminary, at Cincinnati, Ohio. Here he came under the instruction of Dr. Lyman Beecher and Prof. Calvin E. Stone, and was active in mission work. But owing to a temporary failure of eyesight, he was obliged to withdraw at the end of the year, and he spent several months on the farm of which he was always fond.

In the spring of 1851 he became a teacher in the Delaware Literary Institute, a flourishing academy at Franklin, New York. His growing taste for the natural sciences and their application to agriculture and horticulture caused him to spend the next year in the Lawrence Scientific School of Harvard University. While there his attention was chiefly directed to chemistry and botany, under the instruction of Gray, Horsford and Cooke. In the fall of 1853 he returned to the Delaware Institute, as teacher, but his intention of entering the ministry led him to spend the following year in Andover Theological Seminary.

During the year 1855-56, Mr. Orton was pastor of the Presbyterian Church at Downsville, Delaware County, New York, and was ordained January 1st, 1856, at Delhi, New York. In September, 1856, he became professor of the natural sciences in the State Normal School at Albany. Here he was charged with holding heretical opinions, and was constrained to resign at the end of three years of successful service. From 1859 to 1865 he was principal of an academy at Chester, Orange County, New York. From there he was called to fill the chair of natural history in Antioch College, Yellow Springs, Ohio.

In 1869 Governor Hayes appointed him as one of the assistants upon the Geological Survey of Ohio. In June, 1872, he was chosen President of Antioch College, and in 1873 he was elected Professor of Geology and President of the new Agricultural and Mechanical College, located at Columbus, Ohio, which became the Ohio State University in 1878. He remained President of this institution, until 1881, when he resigned the Presidency, but retained the chair of geology to the end of his life.

Upon the reorganization of the State Geological Survey in 1882, Dr. Orton became its chief, and held the office of State Geologist till his death, and is now succeeded by his son. His attention was directed chiefly to economic geology, and Volumes 5, 6 and 7 of the Final Reports of the Geological Survey, one Annual Report and several special ones, were brought out under his direction.

Early in December, 1891, Dr. Orton delivered a lecture at Antioch College, and while returning to Columbus he suffered a stroke of paralysis, which wholly deprived him of the use of his left arm and caused a decided limp in his gait, but left his mental powers unimpaired. During the early autumn of 1899 his health failed perceptibly, yet he was spared a long illness and retained his faculties to the end, which came suddenly and almost painlessly. " He died, as he lived, with the simple dignity and fortitude of a Christian gentleman."

He was a member of many scientific bodies. Among these were the Columbus Horticultural Society, Ohio Archæological and Historical Society, Ohio Academy of Science, Geological Society of America, and the American Association for the Advancement of Science, of which he was President in 1899. His *alma mater*, Hamilton College, gave him the degree of Ph. D., in 1875, and the degree of LL. D. was conferred on him by the Ohio State University at the close of his Presidency in 1881.

Dr. Orton became a member of the Columbus Horticultural Society soon after he became a resident of Columbus, and he was made a life member in 1897. Although not a regular attendant upon its meetings, he never failed to show a deep interest in its work. He rejoiced over every advanced step in horticulture, and was particularly solicitous regarding the reckless destruction of our forests, losing no opportunity to urge the improvement and extension of our existing wood-land. The Columbus Horticultural Society, and also the Department of Horticulture and Forestry of the State University have alike lost a firm friend and wise counselor in the death of Dr. Edward Orton.

# REPORT OF OFFICERS AND COMMITTEES.

## REPORT OF THE SECRETARY.

The present incumbent has been in office only a few months, but the retiring Secretary, Mr. Cunningham, left everything in such good shape that it has not been difficult to take up the work where he left off.

Our Journals are in demand from all parts of the United States, and several applications from libraries have been received for complete files of our publications. An effort was made to enlarge our exchange list which was very satisfactory, and we now are exchanging for the following periodicals:

American Agriculturist.
American Bee Journal.
American Farmer Magazine.
American Gardening.
American Grange Bulletin.
American Horse Breeder.
Agricultural Epitomist.
Canadian Entomologist.
Dairy World.
Farming.
Farm, Field and Fireside.
Farmer's Home.
Farm Journal.
Field and Farm.
Food, Home and Garden.
Fruit.
Fruitman's Guide.
Florists Exchange.
Gleanings in Bee Culture.
Indiana Farmer.
Ladies' Home Journal.
Mechanic Monthly.
Miami Horticulturist.
Michigan Farmer.
Minnesota Horticulturist.
National Nurseryman.
National Stockman and Farmer.
Ohio Farmer.
Our Dumb Animals.
Park and Cemetery.
Practical Farmer.
Rural New Yorker.
The American Farmer.
The Farm Home.
The Forester.
The Public.
The Scientific American.
The Southern Planter.
Vick's Magazine.
Woman's Home Companion.

Respectfully submitted,

HOMER C. PRICE, *Secretary.*

## TREASURER'S REPORT.

Geo. W. Sinks, Treas., in account with The Columbus Horticultural Society.

### RECEIPTS.

| | | |
|---|---|---|
| 1898. | | |
| Dec. 31. | To balance | $51 71 |
| 1899. | | |
| Jan. 20. | Interest on City bonds | 10 00 |
| Jan. 28. | Received for dues | 21 00 |
| Feb. 1. | Interest on Columbus & Toledo R. R. Co. bonds | 175 00 |
| Aug. 2. | Interest on Columbus & Toledo R. R. Co, bonds | 175 00 |
| | Interest on U. S. 3 per cent. bonds | 6 75 |
| Dec. 18. | Interest on U. S. 3 per cent. bonds | 2 25 |
| | Interest on City bonds | 20 00 |
| | | $461 71 |

### EXPENDITURES.

| | | |
|---|---|---|
| 1899. | | |
| Jan. 28. | Paid for postage | $ 2 70 |
| Jan. 28. | Paid J. F. Cunningham, Secretary | 12 50 |
| Mch. 8. | Paid Terry Engraving Co | 4 75 |
| April 13. | Paid C. W. Harper | 2 50 |
| April 29. | Paid C. W. Harper | 1 15 |
| June 8. | Paid C. W. Harper, | 1 25 |
| June 15. | Paid J. F. Cunningham, Secretary | 12 50 |
| July 1. | Paid J. F. Cunningham, Secretary | 12 50 |
| Aug. 3. | Paid Spahr & Glenn | 213 94 |
| Sept. 2. | Paid W. R. Beattie | 4 00 |
| Sept. 2. | Paid J. F. Cunningham, Secretary | 8 33 |
| Dec. 19. | Paid Livingston Seed Co | 1 30 |
| Dec. 19. | Paid W. R. Lazenby, expenses as delegate | 16 50 |
| Dec. 19. | Paid H. C. Price, Secretary | 16 66 |
| Dec. 19. | Paid H. C. Price, postage | 5 50 |
| | Balance- | 145 63 |
| | | $461 71 |

### PERMANENT FUND INVESTMENTS.

| | |
|---|---|
| Columbus & Toledo R. R. bonds | $5,000 00 |
| City of Columbus bonds | 500 00 |
| United States 3 per cent. bonds | 300 00 |
| | $5,800 00 |

Respectfully submitted,

GEO. W. SINKS, *Treasurer.*

## REPORT ON METEOROLOGY FOR 1899.

BY PROFESSOR WILLIAM R. LAZENBY, CHAIRMAN.

(The observations were taken at the Ohio State University.)

JANUARY—Mean temperature 29.9°; highest temperature 62° on the 4th ; lowest temperature, 0° on the 31st ; range of temperature for month, 62°; mean daily range, 17.4°; greatest daily range, 30° on the 23d ; least daily range, 5° on the 9th.

Fourteen days were cloudy, twelve days partly cloudy, and five days were clear.

Rain or snow fell upon ten different days.

Total rainfall for month, including melted snow, 2.86 inches. Prevailing wind direction, west.

The mean temperature was about 4° above the normal or average.

FEBRUARY—Mean temperature, 23°; highest temperature, 59° on the 26th ; lowest temperature, —20° on the 10th ; range of temperature for month, 79°; mean daily range, 17.1°; greatest daily range, 28° on the 28th ; least daily range, 4° on the 18th.

Fifteen days were cloudy, nine days were partly cloudy, and four days were clear. Rain or snow fell upon twelve different days. Total rainfall for month, including melted snow, 1.40 inches.

Prevailing wind direction, southwest.

The mean temperature was 6.8 below the normal or average. The total precipitation was 2.46° below the normal. The coldest day of the year was February 10th—20°.

MARCH—Mean temperature, 39.1°; highest temperature, 70° on the 11th ; lowest temperature, 8° on the 7th ; range of temperature for month, 62°; mean daily range, 21.1°; greatest daily range, 40° on the 10th ; least daily range, 7° on the 16th.

Twenty-five days were cloudy, fourdays were partly cloudy, and two days were clear. Rain or snow fell upon seventeen different days. Total rainfall for month, including melted snow, 4.58 inches. Prevailing wind direction, northwest and southwest.

The rainfall for March was 1.83 inches above the normal.

APRIL—Mean temperature, 53.3 ; highest temperature, 87° on the 30th ; lowest temperature, 21° on the 2d and 5th ; range of temperature for month, 66°; mean daily range, 22.4°; greatest daily range, 35° on the 13th and 21st ; least daily range, 7° on the 8th.

Thirteen days were cloudy, eleven days were partly cloudy, and eight days were clear. Rain fell upon ten different days. Total rainfall for month, 1.21 inches. Prevailing wind direction, west and southwest.

The rainfall for April was 1.78 inches below the normal. The mean temperature was 3.3° above.

MAY—Mean temperature, 63.8°; highest temperature, 87° on the 16th ; lowest temperature, 39° on the 14th and 21st ; range of temperature for month, 48°; mean daily range, 22.7°; greatest daily range, 35° on the 27th ; least daily range, 11° on the 9th.

Fifteen days were cloudy, fourteen days were partly cloudy and two days were clear.

Rain fell upon fourteen different days. Total rainfall for month, 3.35 inches. Prevailing wind direction, southwest. The total rainfall was .87 inches below the normal. The mean temperature was 3.6° above.

JUNE—Mean temperature for month, 71.7°; highest temperature, 95° on the 20th and 22d ; lowest temperature, 43° on the 17th ; range of temperature for month, 52°; mean daily range, 24.3°; greatest daily range, 38° on the 28th ; least daily range, 12° on the 9th.

One day was cloudy, ten days were partly cloudy, and nineteen days were clear.

Rain fell upon thirteen different days. Total rainfall for month, 2.05 inches. Prevailing direction of wind, southwest. The mean temperature for June was but slightly above the normal. The total rainfall was 1.77° below the average.

JULY—Mean temperature, 74.6°; highest temperature, 96° on the 3d ; lowest temperature, 48° on the 1st ; range of temperature for month, 48°; mean daily range, 25°; greatest daily range, 40° on the 1st ; least daily range, 11° on the 8th.

Seven days were cloudy, nine days were partly cloudy, and fiffeen days were clear. Rain fell upon twelve different days. Total rainfall for month, 4.86 inches. Prevailing wind direction, west. The mean temperature was 2.2° above the normal. The total rainfall was 1.58 inches above the normal.

This unusually heavy rainfall for July was the salvation of the corn crop.

AUGUST—Mean temperature, 74°; highest temperature, 94° on the 2d, 4th, 19th, 20th and 21st ; lowest temperature, 53° on the 7th and 8th ; range of temperature for month, 41°; mean daily range, 27.4°; greatest daily range, 38° on the 19th ; least daily range, 12° on the 15th.

Three days were cloudy, eleven days were partly cloudy, and seventeen days were clear. Rain fell upon four different days.

Total rainfall for month, 1.11 inches. Prevailing wind direction, north. The total rainfall for August was 2 inches below the normal. The mean temperature was about the average.

SEPTEMBER—Mean temperature, 65°; highest temperature for month, 99° on the 5th and 7th ; lowest temperature, 31° on the 27th ; range of temperature for month, 68°; mean daily range, 26.5°; greatest daily range, 46° on the 5th ; least daily range, 5° on the 20th.

Three days were cloudy, twelve days were partly cloudy, and fifteen days were clear. Rain fell upon eleven different days. Total rainfall for month, 2.38 inches. Prevailing wind direction, northwest.

The hottest days of the year occurred this month, 99°, on the 5th and 7th. The greatest daily range of temperature took place on the 5th, a difference of 46° in twenty-four hours. The total rainfall was 1.54 inches below the normal. The mean temperature was 3.5° below the normal.

OCTOBER—Mean temperature, 57.5°; highest temperature, 86° on the 15th ; lowest temperature, 23° on the 1st ; range of temperature for month, 63°; mean daily range, 25.3°; greatest daily range, 39° on the 25th ; least daily range, 11° on the 28th and 29th.

Five days were cloudy, eleven days were partly cloudy, and fifteen days were clear. Rain fell upon six different days. Total rainfall for month, 2.15 inches. Prevailing wind direction, south. This was comparatively the warmest month of the year, the mean temperature being 6.4° above the normal. The rainfall for the month was nearly up to the average.

NOVEMBER—Mean temperature, 44.4°; highest temperature, 66° on the 18th ; lowest temperature, 23° on the 7th and 27th ; range of temperature for month, 43°; mean daily range, 19.5°; greatest daily range, 29° on the 7th ; least daily range, 8° on the 22d.

Ten days were cloudy, seven days were partly cloudy, and thirteen days were clear. Rain fell on seven different days. Total rainfall for month, 1.74 inches. Prevailing wind direction variable. The mean temperature for November was 4.4° above the normal, making it an unusually mild month. The total rainfall was 1.46 inches below the normal.

DECEMBER—Mean temperature, 30.5°; highest temperature, 62° on the 11th ; lowest temperature, 2° on the 30th and 31st ; range of temperature for month, 60°; mean daily range, 16.5°; greatest daily range, 29° on the 9th ; least daily range, 6° on the 14th.

Twelve days were cloudy, six days were partly cloudy, and thirteen days were clear. Rain or snow fell upon nine different days. Total rainfall for month, including melted snow, 2.42 inches. Prevailing wind direction, southwest. The mean temperature was 1.6° below the normal for December, and the rainfall was .24 inches below.

### SUMMARY OF YEAR 1899.

Mean temperature for year, 52.2°; highest temperature, 99° on the 5th and 7th of September ; lowest temperature—20° on the 10th of February ; range of temperature for year, 119°; greatest monthly range, 79° in February ; least monthly range, 41° in August ; greatest daily range for year, 46° on the 5th of September ; least daily range for year, 4° on the 18th of February.

The total rainfall for year, including melted snow, was 29.11 inches, which is nearly 10 inches below the annual average for this station.

## REPORT OF THE COMMITTEE ON BOTANY.

One of the very last flowers seen in blossom before the snowy, frosty winter envelops everything, is the well-known *Calendula officinalis*, Garden Marigold of the Old World. It is cultivated in country and city gardens, growing eight inches high with green and succulent oblong entire sessile leaves and orange colored, rather unpleasant scented flowers, and blooming all season till snow comes. Marigold is also called the *Flower of the Dead*, because it has a death-like smell and the bodies of dead children were adorned with this flower in the fatherland. The fresh plants were used as a remedy against cancer, but now are only used by herb doctors. The sap is excellent on wounds. The herb is used for coloring butter, and the flowers are mixed among the saffron and safflower.

The Marigold does not open its flowers when rain is coming, being a very high hygroscopic plant.

J. H. LAGEMAN.

# THE EDITOR'S TABLE.

A department of Book Reviews is opened with this issue of the Journal in which reviews will be found of a few of the best and latest books on horticulture and allied sciences.

Advanced sheets of the Cyclopedia of American Horticulture by Prof. L. H. Bailey, have come to the editor's table. This is to be the most comprehensive work on American horticulture yet published. It is to be in four quarto volumes, and is to contain over 2,000 original drawings. The first volume is to appear during January and the others to follow during the year.

Two years ago our Society made an effort to secure from the Legislature some enactment to protect the forest interests of the State. The attempt was unsuccessful, and two more years have been added to the ruthless destruction of our already too meagre forest territory. That something should be done is becoming more and more apparent.

New York State has met the exigency by founding a college of forestry in which young men may be trained to be foresters capable of managing large forests.

Ohio conditions are such that we cannot expect to maintain many forests large enough to require the services of a trained forester. But what we need is the wood lot, varying in size from five to fifty acres, on every farm. Many hills and rough pieces of land that have been cleared of trees should be reset to valuable timbers.

Some tangible method of accomplishing this should be framed into a bill and presented to the State Legislature. Possibly exempting wood lands from taxation would accomplish the end, but whatever is done to alleviate the forest destruction cannot be done too quickly.

That half a crop is often more profitable than a full crop was never better illustrated than in this year's peach crop. Prices were more than twice as high in 1899, than they were in 1898, and the orchardists net more money from them than they did in 1898.

In establishing a new orchard or fruit plantation the selection of varieties is the pivot of success. It is only a small matter to say whether you will take one hundred trees of one variety or of another, and yet the decision often means success or failure. A safe rule to follow is to plant only standard varieties that are known to succeed. Avoid novelties and new varieties that have not yet been tested. If a kind is known to be really good then it may pay to give fancy prices for stock, but for new untried kinds it is simply a game of chance.

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A few days ago the editor visited the Columbus wholesale markets, and upon inquiry of the source of the winter vegetables in the market, found that the bulk of our radishes were coming from Cincinnati, and our lettuce from St. Louis, and other vegetables from points as far distant. The question at once arose, why cannot these vegetables be grown at home? Are our natural conditions about Columbus such that we cannot successfully compete with the gardeners of these distant points that must pay for packages, selling and transportation before their products reach our markets?

Home grown products of the same quality are chosen in preference to shipped goods, and yet if we follow through a year in the wholesale fruit and vegetable market of Columbus, we find that the bulk of our supply is brought from a distance, and a comparatively small amount of it raised within a radius of twenty-five miles.

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The Annual Report of the Society is now in the hands of the binder and will be mailed to members in a few days. After you have received the bound volume you can greatly aid the Society by distributing the Quarterly Journals among your friends, as they will all be contained in the Annual Report and you will have no further use for them.

# BOOK REVIEWS.

*Moulds, Mildews and Mushrooms.* By Lucius Marcus Underwood, Professor of Botany in Columbia University. 236 pp., pl's 10. Henry Holt & Co., New York. Price, cloth, $1.50.

This is a work that the reviewer, not being a mycologist, approached with awe, expecting to find a strictly technical treatise that would be very uninteresting to anyone but a specialist. But Professor Underwood has expressed scientific truths in such a fascinating style that the reader cannot resist completing the chapters intended for reading.

The book is primarily a manual of the conspicuous woody and fleshy fungi, the cup-fungi, and genera containing parasitic species.

The introductory chapter deals with the relation of animal and plant life, and shows how intimately they are associated, and how misleading and superficial many of our old teachings are. One of the most valuable features of the book is the complete bibliography that is given under each chapter.

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*Evolution by Atrophy.* By Jean Demoor, Jean Massart and Emile Vandervelde. 322 pp. Cloth, price, $1.50. D. Appleton & Co., New York.

This is volume 79 of the International Scientific Series, and the authors are professors in the University of Brussels. The object of the work is to show that an essential element of the process of evolution, as it goes on among plants and animals, is the degeneration, decay or atrophy of organs or parts of organs, while at the same time other parts or organs may, and generally are, being carried to a higher stage of development. On the other hand, they point out that what is true in biology is also true in sociology, that society is constantly changing to adapt itself to surrounding conditions. The authors point out that in this social evolution the phenomena of degeneration, or atrophy, play as important a part as in the animal and plant kingdom. Some of the examples that are cited seem rather "far fetched," but on the whole it is a valuable edition and opens up a comparatively new field for investigation.

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*A. B. C. of Bee Culture.* By A. I. Root; revised by E. R. Root. 468 pp., 8 vo. A. I. Root & Co., Medina, Ohio. Price $1.20, postpaid.

This work was first published in 1877 by A. I. Root. Edition after edition have been called for, and the work has been revised from time to time. The present edition has been thoroughly revised by E. R. Root. The work is what its name indicates, and is written in a clear, forcible style, that can be easily understood by the beginner. It is a cyclopedia of apiculture, the subjects are arranged in alphabetical order, and the work is thoroughly indexed.

About 340 pages are devoted to the general subject of bee culture and about forty pages in the back of the book are taken up with biographical sketches of prominent bee men and pictures of a great many of them are given. It is a valuable book that should be in the hands of every practical bee man.

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*Animal and Plant Lore.* By Fanny D. Bergen. With introduction by J. Y. Bergen. 178 pp. Houghton, Mifflin & Co., Boston and New York. Price, $3.50.

This is volume VII. of the Memoirs of the American Folk Lore Society. It is a collection of the oral traditions of English speaking people. The book has been divided into two parts, Animal Lore and Plant Lore, and under these two parts are given 1,397 sayings and traditions and the locality in which they are common. The work is furnished with copious notes and is a vast store house of the old traditions and signs that have been handed down from generation to generation.

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*The Honey Makers.* By Margaret Warner Morley. 424 pp., 12 mo., gilt top. A. C. McClurg & Co., Chicago. Price, $1.50.

In this book Miss Morley has given a delightful treatise on bees. The first part of the book is devoted to the structure and habits of bees, and the second part is a study of their literature and history. It does not treat of their management, but is rather a literary work of high standard, that treats the bee from a scientific and historical standpoint. The book is written in a fascinating style, well illustrated and neatly gotten up, and would adorn the shelves of any library.

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*Evolution of Our Native Fruits.* By Professor L. H. Bailey, 472 pp., 12 mo., 125 illustrations. MacMillan Co., New York. Price, $2.00.

The object of this work can be no more aptly expressed than in the author's own words: "An attempt to expound the progress of evolution in objects which are familiar and which have not yet been greatly modified by man ; an effort to make a simple historical record from unexplored fields ; a desire to suggest the treasures of experience and narrative which are a part of the development of agriculture, and from which the explorer must one day bring material for history and inspiration for story."

The ability of Professor Bailey as a writer is too well known to every one acquainted with recent literature of horticulture to be mentioned. In this work he has taken up the development of the grape, mulberry, plum, cherry, apple, raspberry, blackberry, dewberry and various other less important berry and tree fruits that are indigenous to America. The account of the introduction of the European grape, and how it was superceded by the native varieties, which takes up 120 pages of the book, reads like fiction. Attempt after attempt to grow the wine grape of Europe was defeated by the rot, phylloxera and mildew, and only when fortune after fortune had been lost, was attention at last turned to the native grape.

The book is a vast store house of historical information on the fruit industry of America, that has been gathered from all sources and put together in a compact and accessible form. Many of the knotty problems of the botany of our cultivated native fruits have been skilfully unraveled by the author, and to do this it has necessitated his visiting European herbaria to see the type specimens of some species. Another valuable feature of the book is the complete bibliography which is given of grape literature ; it alone covers eight pages. The work has been written as a companion to the "Survival of the Unlike," and is fully up to the high standard that has been set by Professor Bailey in his former works.

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*The Insect World.* By Dr. Clarence M. Weed. Cloth, 16 mo., 210 pp. D. Appleton & Co., New York. Price, 60 cents.

This work is one of the volumes of the Appletons' home reading series, which is being published under the editorial supervision of W. T. Harris. The author will be remembered as a former secretary of our society.

The work is a compilation of short articles on entomology, especially adapted to interest and instruct young people in the study of insects. The selections are chiefly from American literature, although a few are from other sources. The make-up of the book is good, and the numerous illustrations are of a high class. It is a work that should be in the hands of young people.

# COMMUNICATIONS AND DISCUSSIONS.

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## ME IMPRESSIONS OF THE HORTICULTURE OF NORTHERN CALIFORNIA.

BY PROFESSOR THOMAS F. HUNT.

(Read at the December Meeting.)

ıe very outset it is proper that I should acknowledge ıerosity of the people of California which made it pos- ›r myself, in company with about one hundred other ers, to see the agriculture and horticulture of a portion ornia under conditions which have come to but few

ɔarty spent one whole week traveling through North- fornia, between Fresno on the south and Oroville on h. During this week we traveled 1,600 miles by rail, -five miles by boat and many miles by carriages, under lance of Professor Jaffa, of the University of California, committee, entirely at the expense of the hospitable nians.

d hardly say that I will not attempt to describe in he horticulture of Northern California, but simply to some of the more striking impressions which I received. limatic conditions are in sharp contrast with the region east. The isotherms run north and south instead of l west. It is said that there is a thermal belt extending nd south about 700 miles and varying from one to thirty width east and west, in which oranges and other citrous fruits can be successfully grown. The seasonal variations of a given locality are often less than the climatic conditions between two localities not far distant. The average summer and winter temperature at San Francisco varies but 8° F. This year in that city, during the first week in July, men almost universally wore overcoats and women wore furs or other equally heavy wraps. I am told that they dress in about the same way every month in the year.

Our party left San Francisco after midnight shivering with cold, although clad in overcoats and winter underclothing, and took breakfast at Fresno, where during the day the thermometer in our car registered 117° F. At 5 o'clock in the evening the thermometer in the Pullman car registered 104° F., and in the same car in the same spot at 9 o'clock it was necessary to employ the ordinary covers of a Pullman car in order to keep warm, so quickly does the earth radiate heat in this clear atmosphere.

Over much of the tillable area the rainfall is twenty inches or less, but, owing to the fact that it almost all falls in the seven months between November and May, inclusive, it is sufficient for the successful growth of the small grains.

One of the most impressive and pleasing features of California is its great variety of vegetable forms. Almost every form of plant life, except strictly tropical plants, find a congenial home within its borders. Nearly all the cultivated fruits of the world, except those of the tropics, can be found growing in a single county of the state. To see the vegetable forms of Russia and the vegetable forms of Egypt growing side by side is a startling and pleasing sight.

While California is an empire in itself, while you are sure to be told that the coast line of California equals the Atlantic coast from Boston to Savannah, while the state is four times the area of Ohio, and while the aggregate productions of agricultural and horticultural products are large, and while these operations are practical on a scale whose magnitude is perhaps nowhere excelled in the world, yet to the man raised upon the boundless praries of the Northwest the smallness of the productions compared to the total area impresses him deeply.

California consists of detached and (except for the railroads) isolated communities, containing prosperous, keen, alert and refined people—beyond is the wilderness.

The University of California is located in Oakland, just across the Bay of San Francisco from the Western metropolis of the same name. I was told that one-third of the population of California lives within a ten-cent fare of the University. San Francisco and its suburbs, in other words, constitute one-third the population of Calfornia.

The variation of topography, soil and climate has brought about a segregation and specialization of industry, especially in horticulture, not paralleled elsewhere in the United States.

One may travel from Chicago, Ill., to Hastings, Neb., on the C., B. & Q., or some other paralleling railway, and as far as the eye can reach one sees a checkerboard of corn and oats, with an occasional field of grass. These conditions prevail over a strip of territory 100 miles in width. To cover this district requires twenty to twenty-four hours on our fastest limited trains.

The oldest and best developed valleys of Northern California are the Santa Rosa on the north and the Santa Clara on the south, each 75 to 100 miles long and perhaps averaging ten miles in width. Passing up the narrow valley of Santa Rosa to Ukiah one passes through a dairy district, a poultry district, a fruit district—largely peaches and grapes—and a wine district, where at Asti is to be seen the largest wine tank or cistern in the world (500,000 gallons). The Italian-Swiss Colony, which built this cistern to hold its surplus wine, has its offices in the principal cities of the world, yet I doubt whether the district over which the grapes are or can be raised economically within the influence of this firm, is equal in area to Franklin county. The railroad which operates in this, the oldest inhabited and developed valley of the state, advertises itself as possessing special attractions for the hunters of wild game.

The orange district of Northern California is at Oroville and Palermo. I am indebted to Mr. Eben Boalt at Palermo, formerly of Erie county, Ohio, for special courtesies.

This district is between the thirty-ninth and fortieth parallels, or about in the latitude of Philadelphia, and perhaps 500 miles north of Los Angeles. From Palermo alone last year were shipped 130 carloads of oranges.

The total area of this colony, which was surveyed in 1888, is 7,000 acres; 3,500 acres have been sold, 3,000 acres planted and about 1,000 acres are in bearing oranges. Besides oranges are raised also peaches, olives, English walnuts and lemons. No trees in the colony are over eleven years old and most of the trees are about eight to ten years old, are ten to fifteen feet high and eight to ten feet through the head of the tree. Seventy-five boxes to the acre are considered satisfactory from the eight to ten-year-old trees. As showing the maximum results of this locality there may be given the yields obtained from the twelve-acre "proposition" belonging to Mr. A. Frost, who has one of the oldest and best orchards in the colony. In 1896 the yield was 80 boxes per acre; in '97, 400 boxes per acre; in '98, 1,500 boxes per acre. For this last crop about $1.25 per box was obtained. The orchards are here dependent entirely upon irrigation, as I understand citrous fruits almost always are. My observation is that only a small percent of the deciduous fruit trees are irrigated. Notwithstanding the fact that irrigation is largely recommended, it is an important and interesting fact that the people of California do not make use of irrigation unless they are compelled to do so. At Palermo water for irrigating purposes costs 12½ cents per miner's inch—that is to say, for the amount of water which will pass through an inch opening under four inches of pressure during twenty-four hours.

One instance was given where $7.00 worth of water per acre was used during a season, while in other cases the water was said to cost as little as 75 cents per acre. A number of the orchards in this colony are owned by non-residents, who pay the resident colonists from $12 to $25 per acre, $18 being about the average, for taking care of their orchards, in addition to the expense for water.

At Marysville and Yuba City peach orchards of $160 acres are common. While at Woodland we visited the Yolo orchard, which contained 520 acres of bearing trees, principally peaches, and will soon have 640 acres of bearing trees. While the principal crop in these orchards is peaches, yet apricots, prunes, nectarines, almonds and grapes are grown commercially, the latter being raisin or shipping grapes. The common sized holdings are from ten to forty acres.

Peaches are sold by the ton. Five tons to the acre seems common and satisfactory, although ten tons to the acre appears to be not extraordinary. This year peaches are selling at $30 and $32 per ton, delivered at the cannery or at the depot for shipping. The price is high this year on account of the failure of Eastern fruit. Sometimes only $11 per acre are obtained.

The amount of money that will come into these communities this year is enormous compared to the amount of money which will be received in any agricultural community of equal areas in Ohio, and yet if the total area which is devoted to fruit was marked on the map it would be insignificant indeed.

Fresno, on the northern border of Southern California, or on the Southern border of Northern California, is one of the great centers of the raisin grape industry. Here it is aptly said they raise enough raisins to command the attention of the commerce of the world. They raise three-fourths of the raisins of the United States at this place, and yet the total area devoted to raisin grapes in this locality is less than two townships.

The variety of grape chiefly used for raisins is the muscat. Here, as elsewhere, the manner of trimming grapes is entirely different from Eastern practice. The vine is trimmed down to the stump, about fifteen inches in height, and the vines that are thrown out make a dense, low head, producing their bunches close to the ground.

While requiring judgment, the process of making raisins is extremely simple. The bunches are gathered, placed upon trays and dried in the sun.

The seedless grapes are somewhat grown, but since machinery has been perfected for rapidly and perfectly seeding grapes, which process our party had the opportunity to examine thoroughly, the demand for seedless grapes has declined.

The rainfall at Fresno was less than five inches in 1898, the average being nine inches. Irrigation is therefore necessary.

Instead of selling water by the miner's inch at Fresno, I am told the usual custom is a certain price per acre per year, being last year 62½ cents per acre per year.

At or near Salinas is an area—one of a few limited areas compared to the whole state—where the sugar beet thrives so excellently that Claus Spreckles feels justified in building the largest sugar beet factory in the world. This factory is 600 feet long, 100 feet wide and 125 feet high. It has a capacity of 3,000 to 4,000 tons of sugar beets per day, and has all its machinery in duplicate, so that when one piece gets out of order another stands ready instantly to take its place. This factory is to cost two and one-half million dollars. Two incidents occurred while we were visiting this factory which illustrate the magnitude of enterprises of California, notwithstanding their local character. Here was a factory to cost two and one-half million dollars in the course of erection in the middle of July which appeared to be far from complete, and which should be ready to run within eight weeks, while there were growing in the fields nearby presumably sufficient beets to furnish this factory with 3,000 tons of beets per day for 100 days, or 300,000 tons of beets. My admiration for the confidence with which a man could coolly put two and one-half million dollars into an enterprise like this with the apparent assurance that at the proper time the mill would be ready to run, was not lessened when I subsequently learned that Mr. Claus Spreckles personally seldom visited the factory.

The other instance that impressed me was that Mr. Miller, of the firm of Miller & Lux, California cattle kings, happened to be at the factory on the day of our visit for the purpose of contracting for all the refuse of this great factory to feed to their cattle. From two or three apparently trustworthy sources I was told that this firm, instead of shipping cattle from Southern Nevada and Southern California, made a practice to graze them leizurely to San Francisco, and that every night they could camp on their own land.

Another example of a localized industry was found near Gilroy in the Morse Seed Farm. This firm has 400 acres near Gilroy and 500 acres at Santa Clara. This 900 acres is devoted to the production of the seeds of onions (called by Mr. Morse biennial lillies), carrots, lettuce and sweet peas. These plants are grown for the most part without irrigation, and this year with less than ten inches of rainfall, the normal rainfall at Gilroy being about twenty inches and at Santa Clara sixteen inches. This farm is said to have 225 acres of sweet peas. I walked around one field of sweet peas that I estimated contained eighty acres. These were grown without irrigation, with less than eight inches of rainfall for the entire year. They stood all over the field at least three feet high, and they were so dense upon the ground that it would have been a difficult matter to get among them. The vegetable growth was enormous and surprising. The explanation was probably natural sub-irrigation, which is probably the explanation of the prosperity of some other localities, i. e., at Yuba City, where peaches are grown to such perfection. The town and the surrounding territory is annually inundated by the overflow of the river, and it is recognized that the greater the inundation the greater the crops. It is simply the problem of the Nile valley on a small scale.

I have left for special mention San Jose and its environs. Here is a territory twenty miles square set solidly almost to orchards, principally prunes. It is said to be the largest prune territory in the world. Drive in any direction within this territory and you will be flanked on every side with thrifty and perfectly cultivated orchards. There are handsome country homes, fine graded rural schools, rural mail delivery and sprinkled country roads. It is claimed that $8.00 per month per mile is spent in sprinkling roads during the dry season. This is done, primarily, I understand, to keep the dust off the fruit, but it goes without saying that whatever the purpose, it is evidence of abundant prosperity. A man with fifty acres of orchard appears to have an assured and satisfactory income. This is the most prosperous and cultivated rural community I have ever seen, and yet it is on the edge of the wilderness and seems to me will remain so for many years to come.

The productions of these communities, instead of becoming more varied, as is generally expected, with the increasing age of the community, are becoming less varied, i. e., at Yuba City there have been planted peaches, apricots, prunes, olives, pears, figs, raisins and table grapes. The apricots, prunes, pears and grapes are graduallygiving way to peaches, because experience seems to show that here they have just the combination of soil and climate that grow peaches to perfection and defies competition, while they have found that other localities can raise prunes, pears, grapes, either cheaper or to a greater perfection. Similar reasons have made San Jose the largest prune district, the Morse Seed Farm near Gilroy unrivalled for seed peas and Fresno without peer in the production of raisins. Taking the state as a whole, however, its productions are becoming more and more varied.

The Mayor of San Francisco in his address before the A. A. A. C. & E. S. stated that California's wealth came first from its mines. This was soon exceeded by the products of its wheat fields, and now the wealth from both had been exceeded by its fruit industries. It seemed to me that I could see evidence that the habit of mind of the miner had been brought to bear in the development of its agricultural and horticultural interests. Many a man has prospected in a tree hole without getting pay fruit, while many another, with no greater knowledge of horticultural seams, has struck it rich, and like the miner, each takes his fate philosophically and tries again.

The rapidity and growth of fruit trees in California is worthy of special mention. Peach trees, for example, come into bearing at three years of age, and are as large as they would be in Ohio at six years, and at six to eight years of age fill the rows. This is, in a large part, due to the long period of growth. Peach trees beginning to bloom in February hold their leaves until November. From orange trees, which are evergreen, ripe fruit may be picked in some cases every month in the year. I myself picked a ripe orange in July, the growth of a former year, while the tree was loaded with large green fruit of the present year.

In drawing this paper of Impressions of the Horticulture of California to a close, it is proper that I should mention the most lasting horticultural lesson which our party received, and this was the lesson in clean culture. Absolutely clean culture is a *sine que non* of successful horticulture in California. By absolutely clean culture I mean absolutely clean culture. One may see orchards containing from 10 to 500 acres each in which the cultivation is so perfect that not a spear of vegetation can be found within the length and breadth of the orchard except the trees therein planted. No more impressive sight can be seen than one of these magnificent orchards thus perfectly cultivated, and there was nowhere seen a sight which more perfectly told the story of the skill, enterprise and ability of the orchardists of California.

## APPLE CROP OF 1899.

BY LOUIS K. SUTTON.

(Read at the October Meeting.)

It was my privilege to be selected a member of the Press Committee at the National Apple Shippers' Association held in Detroit August 2–5, 1899. At that time our committee received reports from every apple growing State in the Union, and most of the estimates were prepared by thoroughly competent apple men. Our report differed little from that of Mr. B. W. Snow, Statistician and Horticultural writer for several of the leading fruit journals of our country, viz., 50 per cent. of a full crop.

But the drought and need of spraying and cultivation changed the conditions ; orchards that were carefully sprayed at the proper time and well cultivated held their fruit remarkably well and the cool nights and several frosts early in this month colored the fruit in many orchards handsomely, while the orchards that were not sprayed, had no cultivation, and in many instances were heavily sodded, the fruit dropped badly, and the fungus, insects, and heavy winds the latter part of September, did much damage.

This season the Rome Beauty, Ben Davis, and Smith Cider, in Lawrence, Gallia and Washington counties, Ohio, are the finest ever grown in the cultivated orchards ; Ross county also has some fine fruit, but lacking the color of that grown in river counties ; Delaware, Franklin and Licking counties, in portions, had a good yield. Taking Ohio as a State, the crop is fully 60 per cent. of a full crop, but outside of the above counties the fruit is only fair. The fruit began dropping badly early in the season, and continued until picking time. In Virginia the Albemarle Pippin, Winesap, Johnson's Winter and Ben Davis are of excellent quality in the cultivated orchards in the hilly districts. New York has a fair yield of Baldwins of good quality in the principal apple producing counties ; Greenings and Spys good, but lightly loaded. In Michigan the Steels Red and Spy are fine ; other varieties rather poor, and suffered badly from drought. In the Western States the crop promised very fair in July and the early part of August, but the continued dry weather prevented the proper growth. The fruit began coloring early and dropped so badly that the yield will be very light and quality poor, outside of the Jonathan, which matures early. In California the Belleflower and

Newtown Pippin grew to perfection this season, but yield rather light. In the New England States the yield very light; quality inferior, with the exception of Baldwins.

Without doubt there were two apples on the trees in August to where there was one apple one year ago at the same period. But it is the opinion of the writer that fully forty per cent. dropped during the latter part of August and September, and at October 1st there were not any more cold storage apples in the country than at the same time of season in 1898.

The orchard producing the finest colored and most perfect fruit this season was one that had been carefully pruned, thoroughly sprayed three times, the body of the trees washed with old-fashioned soft soap, causing the bark to become smooth and glossy, the ground well set in clover. The crop on this orchard realized seventy-five cents per barrel more than any other orchard in the county. The trees made a good growth and are in fine condition for another crop next season.

What is most needed in the apple line at the present time is a variety that will eat and cook well during September and October. Good apples were very scarce this season during the months above mentioned, and demand strong, caused partially by the shortage of peaches and the high price of grapes. The Maiden Blush, Gravenstein and Porter are excellent for these months, but the supply seldom equals the demand, and the horticulturalist who can originate an apple that will be suitable for the market during these two months will have the thanks of all dealers and consumers.

Among the new varieties of apples that made a good showing this season is the Grimes' Golden, being a fine cooker, splendid eating, and the fruit running even size and the trees being well loaded; also cold-stores equal to, if not better, than any other of the white varieties. The Red Harman, originating in Lawrence county, is also an exceptionally good keeper ; while quite hard at this season of the year, its pink color and snow-white flesh makes it an attractive apple, and its juicy flavor will always make it a desirable fruit for family use. The trees are inclined to overload, causing the fruit to be rather under size.

Ohio and Virginia will have the best apples for export this season. The Albemarle, or Newtown Pippin ranks first, Rome Beauty, second, and Winesap, Baldwin, King and Ben Davis next. The demand from Germany is unusually strong for so early in the season. The total exports so far amount to nearly 360,000 barrels, which is certainly very encouraging to holders on this side of the water.

Apples as a rule keep well when the season is dry, but this fall, from some cause, the fruit is ripening very fast. Even the late keeping varieties are mellowing rapidly, and apples that were carefully picked and placed in cellars for winter use are being taken out and sold, the growers preferring to take present prices rather than hold for an advance and stand the shrinkage. The fruit that was gathered early and placed in storage is holding well, and not until next spring can the holders tell with much certainty the profit on their investment.

In my travels over the different States, I have always found that the grower who pays the most attention to the care of his trees and ground, seldom fails of a crop of apples; some seasons, of course, only a light yield, but on the average his orchard brings in more money for the investment than any other field on the farm.

As an incentive to farmers to plant more apple trees and carefully cultivate them, I will state that one man in Lawrence county has an orchard of fifteen acres, the trees twelve years old from the time of planting, and he has sold over fourteen hundred dollars worth of apples net, so far, the ground costing him only $18 per acre; the trees are in a healthy condition, and should yield good crops for the next twelve years.

## REPORT ON THE APPLE CROP.

BY NELSON COX.

In trying to give a report of the apple crop of the year it will be necessary to commence with the spring. We sprayed our orchard three times, once before the bloom, and again just after the bloom dried up and fell off, and the third time about two weeks later. The bloom was very full and very white, both of which I regarded as a poor sign of a full crop of apples; and in the spring, after the apples had set, there appeared to be only a small set on the trees, some thinking there were not enough to make one-tenth of a crop. But we found at early picking time there were enough on the older trees to make a full crop, and on some parts of my orchard of about twenty years of age, the trees were overloaded.

We commenced picking on the 18th day of September (about one week sooner than we had ever picked) and went over the entire Rome Beauty orchard, taking off only the largest and best colored apples, which were mostly on the top of the trees, lighting up the trees about one-half. In the meantime the apples had been sold to Mr. F. M. Colton of New York City, to go into cold storage at once, the price of all the No. 1 apples to be $2.50 per barrel. We commenced picking over the orchard the second time about the 10th of October and found the apples had grown so much and had colored so highly, that it could hardly be told that the trees had been picked over. Toward the last of the picking the apples dropped badly, a thing I had never seen before when making two pickings. Generally, in other years, the last picking stuck to the trees as tightly as the first. But not so this time, for the apples had got very red and were ripe, so they came off easy. We made out a thousand barrels of No. 1 apples, which I think were the finest Rome Beauties I ever handled, and I have raised apples for the last forty years. We have sold another thousand barrels of dropped apples, and other varieties, which are making us about $1.25 per barrel ; and then we have on hand yet over two hundred barrels of Jennet and a few other varieties.

A few general remarks and then I am done for this time. As I stated, we sprayed our orchard. That had a great deal to do with the crop. The apples were very free from worms and clear of blemishes, and colored very highly. The trees held their leaves and to-day, the 8th day of November, the trees are as green as they were the first of September. Other orchards in my neighborhood, not sprayed, lost their leaves by the first of October, the apples were wormy and scabby, fell early, and were sold cheap—say at an average of $1.25 per barrel. "Well," says one man, "how did you get so much for your apples?" I posted myself as well as I could about the crop by reading the agricultural and horticultural papers, and by attending the State and other fairs and the meetings of the State Horticultural Society, and talking with the members and men in the same line of business with me.

## PEACH CROP OF 1899.

BY WILLIAM MILLER.

In reply to your request for a report upon the peach crop of 1899, I will say that the year was one of very unusual conditions. Never before in the experience of peach growers here, was such low winter temperature followed by a crop of fruit. Ten to twelve degrees below zero is usually fatal to peach buds under ordinary conditions. Last winter, two successive mornings the mercury stood at fifteen to seventeen below. Old peach growers were astonished to find live buds when the weather had moderated. This unquestionably was the result of the thorough ripening of the wood the previous fall, and the perfectly dormant condition of the buds caused by the uniformly cold weather of early winter. Except for these two days the weather conditions of the whole year were all the peach grower could desire. The mild temperature and absence of cold rains during March and early April prevented any development of the leaf curl.

In some cases the trees themselves were killed without much injury to the fruit buds. Wherever, from any cause, trees were lacking in vitality, caused by borers, excessive leaf curl, or over cropping the previous year, or where the drainage was imperfect, or the character of the soil such as to freeze deeply, many trees were injured or killed outright. Nor is the extent of this injury yet fully apparent, for,—owing to the absence of snow during the severe weather,—it was the root instead of the top which sustained the injury. Thus the instructions sent out as to pruning frozen trees were of no value for our locality.

The peach crop this year ranged from a full one on the so-called hardy varieties, to a total failure of those of tender type of buds. Salway, Lemon Free, Hill's Chili and Crosby were among the best producers. Elberta, Smock, Bernard and all the early cling varieties did fairly well. Crawford's, Chair's Choice and others of that type, were almost total failures.

Crops were modified also by location of orchards, as to elevation or air drainage, the character of the soil, but most of all by the treatment and care of the trees during preceding years. The orchardist who gave most attention to pruning and cultivation when the crop was a failure in 1897, was this year amply repaid for labor then performed.

Owing to short crops and failures in other peach growing centers, prices were very remunerative. From a crop only 40 per cent. of 1898, the banks report a greater money return than at that time. The shipment of peaches from this railway station (Gypsum) amounted to about 85,000 bushels, with probably as many more from other shipping points in this vicinity.

In August the writer visited many of the best peach orchards in western New York, and returned more than ever convinced of the superior advantages of his own locality for growing this fruit.

## PEAR CULTURE, AND REPORT ON THIS SEASON'S CROP.

BY H. WARREN PHELPS.

(Read at October Meeting.)

There seems to be very great difficulty in some sections and on some soils here in Central Ohio to get regular yearly crops of pears. In fact, in many neighborhoods, pear trees fail to produce crops where the trees are planted on the same kind of soil of which, in adjoining fields, the trees bear largely of fine fruits. These results seem to indicate that culture means something, as well as do soils, in the production of good pear fruit.

We have noticed that pear trees, where planted on clay soils, grew well and produced very fine fruit, while on other fields near, of same kind of clay soil, the trees were affected with blight. The same results have been observed with other kinds of soil. This seems to indicate that the proper substance is not in those soils to produce healthy trees, therefore inferior or no fruit.

It has now come to a time when the fruit growers must know just what is in the soils on which they desire to plant pear trees (or any other fruit trees) in order to determine whether or not their labors will produce profit.

When the lands in this county were new, and fresh from clearing off the native forest, fruit trees of all kinds grew vigorously and bore abundantly, and ripened delicious pears on any kind of soil; the altitude did not seem to make any difference. Was it for the reason that the soil was full of decayed vegetable matter, rotted wood, and ashes from burned wood, brush and stumps? If so, then we must now place in the worn soils the same substance which was in our soils during the early years of this county's existence.

It has been noticed that the use of ashes, salt and muck around pear trees has been the means of reviving many seemingly decaying trees and producing very fine fruit, while trees in the same kind of soil, not thus treated, have died or been blighted, or have failed to produce good fruit. We must know how to treat soils in order to get good results in fruit raising, and the pear is becoming one of the most difficult of fruits to produce. I have used muck, the sediment deposited in beds of small streams, around the roots of pear trees with good success on clay soils.

We have several trees near to the house, over the roots of which have been thrown the slops from the kitchen; they are very vigorous. We also use salt, throwing it around on the surface—not more than one quart, in spring time, for a small tree; other trees near by, not so treated, have not shown so healthy and vigorous growth.

Pear trees, last spring, were apparently very vigorous in Blendon township, Franklin county, and the southern portion of Delaware county. Many of the trees were very full of bloom, while others had no bloom on; a few trees had not more than a dozen blossoms on their branches. The bloom on some of those trees fell off, while on others a portion remained.

There has been a small supply of fruit, much of it of fair quality; a small portion of it very fine. The soils have not seemed to determine this altogether; some very fine specimens were grown on clay soils, while others were grown on black loam mixed with clay; that is, loamy soil with heavy clay subsoil.

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